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COLLECTIVE REVIEW

SEPARATION OF THE CAPITAL FEMORAL EPIPHYSIS IN THE ADOLESCENT

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SEPARATION or slipping of the capital femoral epiphysis in the adolescent is one of the most controversial subjects in the orthopedic literature. Although the term "slipped epiphysis" is a misnomer, it has enjoyed common usage and will be employed in this paper despite the fact that various names such as epiphyseolysis, sliding of the femoral epiphysis, adolescent coxa vara, osteochondritis of the neck of the femur, epiphyseal fracture of the hip joint, epiphyseal coxa vara, and epiphyseal coxa anteverta have, at various times, been introduced.

This condition consists of a separation of the head and neck of the femur, occurring at the metaphyseal side of the capital femoral epiphysis, with a subsequent gradual or sudden change in the relation of the head to the neck. The head, contrary to its title, does not slip but remains in approximately its normal position in the acetabulum, while the neck rides upward and forward, resulting in external rotation and slight shortening of the extremity.

Slipping of the femoral epiphysis at its proximal end was first recognized by Brousseau in 1867. Not until 1888, however, was the condition described by Muller. Subsequently, numerous articles have appeared in the literature devoted to the various phases of etiology and treatment. Key, and Noble and Hauser, in 1926, in extensive reviews of the literature, did much to stimulate interest in this condition, and since that time extensive study has been carried out.

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The purpose of this paper is to review the extensive amount of work which has been done on this subject so that a clearer understanding of the problem at hand may be gained.

INCIDENCE

Slipped epiphysis in the adolescent is the most common cause of disability involving the hip. Scott placed it fourth as the cause of all disabilities involving the hip, including tuberculosis. Waldenstrom, reporting from Sweden, found that of 16,000 patients seen in the Orthopedic Hospital over a 5 year period, 111, or 1.70 per cent, had slipped epiphyses as compared to 1.84 per cent with Legg-Perthes' disease. Sullivan stated that at the Boston City Hospital Clinic an average number of 12 patients a year was seen. Key described slipped epiphysis as the most common cause of hip disability in the adolescent, pointing out that less than 10 per cent of the cases of tuberculosis of the hip begin at this time. Legg-Perthes' disease is well recognized as occurring in a younger age group. Wilson (54), in reviewing the fractures of the neck of the femur in children seen at the Los Angeles General Hospital, reported that within a period of 10 years only 10 fractures of the femoral neck were seen.

This condition, then, is characteristically one of adolescence. This is even reflected in the different ages of onset in the two sexes, the earlier onset in females corresponding to an earlier peak of adolescence. Males are more commonly affected than females. Although MacAusland reported an incidence of 80 per cent males, and Ferguson and

Howorth an incidence of 56 per cent males, the average ratio in all of the reported cases was approximately 2 to 1 in favor of the males. All authors agreed that the lesion appeared somewhat later in males than in females. The mean age of onset in the girl was at 12 years, and in the boy at 14 to 15 years. Ferguson and Howorth, in a series of 70 cases, reported also a seasonal variation corresponding to periods of greater activity, thereby adding one month to the summer for the boys, to include the football season.

Although there was considerable variation in the reports of different series, in the ratio of involvement of the left to the right hip, the average ratio for the reported cases was approximately 5 to 4.

There was even greater variation in the reports on the number of cases with bilateral involvement, possibly related to interest and study of both hips in patients with apparently unilateral involvement. The average incidence reported was the same as in those cases reported by Key before 1926, or, approximately 15 per cent.

ETIOLOGY

In considering the etiology of this disease, the outstanding fact noted was that almost without exception the onset occurred during adolescence. Likewise, in the individual child, it was reported by several authors, the parents described the onset as following a period of "growing like a weed" although there had been no actual measurements, periodically, of the height of these children preceding the onset.

It is of interest to review some of the changes occurring in the body during the adolescent period with a view toward their possible bearing upon this condition.

Local changes at the capital femoral epiphysis. Key, Badgley, Kleinberg and Buchman (28), and others have pointed out a number of changes which normally occur at this epiphysis and the surrounding area during this period:

1. The epiphyseal plate, which normally occupies a horizontal position during childhood, assumes a more oblique relationship during adolescence.

2. There is a spurt of increased growth at the epiphysis with some physiological widening of the epiphyseal plate.

3. Thinning of the periosteum and the retinacula of Weitbrecht connecting the head to the neck occurs.

4. The neck of the femur lengthens and increases in density, lessening its angle of junction with the shaft.

General changes in the body.

1. Changes in height-weight relationship. Noble and Hauser have shown that the weight curve reaches its greatest relative peak during this period. Also, at this time the so-called Froehlich's syndrome is likely to develop. This condition has recently been termed by Warkany as benign adiposogenital dystrophy of adolescence, and is only slightly less common in girls than in boys. As slipped epiphysis is common in this group, it may be described more fully. These children show not only adiposity, particularly in the mammary and abdominal regions and in the upper arms and thighs, but also exhibit increased skeletal and muscular development, and are often described as "overgrown." Relatively small and sometimes proportionately "underdeveloped" genitalia are often present in the males. Corrected basal metabolic rates in these children are normal or elevated, and the obesity usually subsides after maturity is reached. The genitalia then appear normal. Warkany, Newburgh, Bruch (9, 10) and others have emphasized the absence of hypothyroidism in these children, and believed that the condition might be due to transient changes in the endocrine balance with possible hyperfunction of the thyroid or anterior pituitary.

Other children at adolescence show a sudden, rapid increase in height, becoming much taller within a short period of time.

2. Chemical balance. Johnston (25, 26) has shown that the adolescent child exhibits a marked tendency toward the development of negative nitrogen and calcium balances. This is particularly true in the "overgrown" child described above. He studied 3 patients with slipped epiphysis, all of whom were found to have negative, or very low, calcium balances, but which could be corrected or improved by the administration of vitamin D. He recommended prophylactic administration of calcium with vitamin D in the preadolescent period. Ghormley and Fairchild reported blood chemistry studies on 4 patients in whom the calcium was normal or high. Very few reports were made on blood chemistries in these patients although it was agreed that neither chemically nor pathologically was there found evidence of rachitic change.

3. Endocrine changes. The exact nature of the endocrine changes of adolescence has not been worked out. It has been shown by Johnston (25, 26) that hyperthyroidism in children reaches its peak at this period, often subsiding as maturity is reached. Even more often hypothyroidism is present in a mild degree, evidenced not by obesity but by delayed growth and development, fatigue and inattention.

4. Circulatory changes in the femoral head. Contrary to the popular belief that the nourishment of the femoral head in infants and children is due to a patent artery in the ligamentum teres which penetrates the head, Wolcott, in studying the femoral head, found that in infants and children the artery of the ligamentum teres does not penetrate the femoral head or contribute to its nourishment until about the twelfth or fourteenth year of life, and in 20 per cent of the cases never penetrates the head. He pointed out that this fact may have some bearing on the etiology, and Carrell and Carrell attributed the large percentage of aseptic necrosis of the femoral head in fractures of the neck in children to this fact.

5. Psychologic changes. This period often engenders a much greater desire to excel in sports and other physical activities, and a growing resistance to restraints imposing normal rest.

Theories of etiology. Three principal theories have arisen to explain the occurrence of the lesion, drawn from the above collection of facts and from observation of patients clinically and pathologically. It is probable that more than one theory may be active in any given case with various factors interacting to produce the lesion.

1. Traumatic theory. Trauma apparently plays a very definite part in the production of slipped epiphysis, and many authorities adhere to this as being the sole cause of the condition. Most authors agreed that trauma of either slight or great degree was the most common precipitating factor in the onset of symptoms, although there was disagreement as to whether trauma alone could displace a normal femoral epiphysis. Kleinberg and Buchman (28), Ghormley and Fairchild, and others pointed to the physiological changes in the epiphysis which render it mechanically more susceptible to traumatic separation, pointing particularly to the more oblique position of the epiphysis, the widening of the epiphyseal plate, and the change in the angle of the femoral neck. They felt that these factors in the presence of trauma were the principal predisposing factors in the development of the lesion. Key stressed the thinning of the periosteum, which in childhood is thick and strong. In adulthood, after the bone becomes completely ossified, the periosteum then becomes thin. Key felt that with this rapid thinning over a still cartilaginous union, sufficient weakening was produced in this link between the head and the neck to allow separation induced by even minor trauma. Wilson (55) also stated that the periosteum was "the chief sustaining band between the epiphysis and the diaphysis," and quoted experiments carried out by Oliver and Poland on cadavers, in which this was demonstrated. Ghormley and Fairchild, on the other hand, demonstrated a case of nearly complete separation of the epiphysis in which the periosteum was still intact, and believed that the thinning was secondary to stretching rather than a primary contributing factor to the separation.

Badgley, Sever, and Ghormley and Fairchild agreed with Walmsley's theory that the mechanism of displacement is produced by an extension force applied to the head of the femur, locked in the acetabulum. Walmsley showed that at 15 degrees extension the head of the femur is locked securely in the acetabulum, further extension being precluded by the iliofemoral, or "Y" ligament of the femur. Hyperextension beyond this point, he believed, would result in motion at the epiphyseal line.

Taylor believed that in the acute type, with a single injury and sudden onset of symptoms, a fracture is sustained through the juxtaepiphyseal line with resultant loss of continuity. Sutra, and others, believed that the pathological findings are those of fracture through the epiphyseal line with subsequent attempts at healing. Brogden believed that trauma plays a very important part in the production of slipped epiphysis and suggested the term "epiphyseal fracture" for the acute traumatic type.

If trauma is accepted as the only cause of slipped epiphysis, even with the added factors of physiologically increased vulnerability of the epiphysis, it becomes difficult to explain the relative infrequency of this condition in adolescents who are repeatedly exposed to trauma of all degrees of severity. Likewise, the fact of fairly frequent bilateral occurrence, the second hip often being affected while the first is under treatment, is hard to understand on the basis of trauma alone. Foley stated, "trauma can never displace the normal upper femoral epiphysis; if it is severe enough it will fracture the neck, leaving the epiphysis undisturbed." He quoted the experiments carried out by Allernshaw and Wood-Jones to demonstrate this. Howorth, in 1941, considered trauma only an incidental cause of slipping.

It appears that there must be, in these adolescent girls and boys, some additional factor which makes them more susceptible to the usual traumas than the majority who do not develop slipped epiphysis. If a softening, or loosening, of the epiphysis occurs, it is easier to understand how even minor trauma, such as the static effect of overweight, muscle pull, and slight injuries can produce displacement. Many authors have proposed an endocrine background for such changes.

2. Endocrine theory. There are a number of factors which support the theory that unusual softening of the epiphysis leading to separation may have an endocrine basis. First is the fact that the slipping always occurs at the peak of rapid growth, at a time when profound changes are occurring in the body under the control of incompletely understood endocrine influences. Ferguson and Howorth, in a report of 70 cases, stated that in the few cases which occurred before the actual spurt of adolescence, other factors such as overweight and trauma were unusually prominent.

The fact that the lesion is often bilateral also leads one to suspect that a similar change is occurring simultaneously in both epiphyses.

There is some suggestion of increased familial incidence, although there are few detailed reports concerning this point. Scott reported one case in which the father also had a coxa vara, and Compere reported the case of a family in which two brothers and a sister were affected with slipped epiphysis as they approached adolescence. The fact that has been repeatedly noted by many authors was that the lesion is very often associated with a particular type of body build, primarily the so-called Froehlich type individual, and secondly the very tall, thin person. The exact nature of endocrine disturbances in these individuals has not been determined. Yet, it has been well shown that particularly in the obese children, there is a much higher familial incidence of obesity and also of diabetes mellitus than in the normal population.

Noble and Hauser stressed the importance of endocrine factors; MacAusland reported 42 per cent of 45 patients to be obese or with other unspecified endocrine disturbance; Forrester-Brown reported the finding of such changes in 86 per cent of 11 cases; Brogden, in 65 per cent of 57 cases; Badgley, in 5 per cent of 27 cases; Ghormley and Fairchild, in 26 per cent of 55 cases; and Pomeranz and Sloane (40), in 40 per cent of 101 cases. Scott stated that "Endochondral ossification is largely dependent upon function of the sex glands and the hypophysis, for many cases point to disordered function of these glands," but gave no evidence of their disordered function. Ghormley and Fairchild stressed the fact that 61 per cent of their 55 patients showed normal or only slightly excess weight. They did not state whether measurement of weight was judged in relation to height, which in "overgrown" children is often also above the average.

Wilson (57) also brought out the fact that even when slipping occurs on one side early in adolescence, and is quite severe, the final shortening as compared to the other side is usually relatively slight. He believed that in these cases early closure occurs on the involved side as well as on the uninvolved side, indicating a metabolic disturbance.

The fact that these lesions may occur gradually with absolutely no history of trauma greater than the normal trauma of weight-bearing and muscle pull across the joint also suggests that there must be abnormal softening or loosening before slipping can occur.

As to the actual mechanism in which ossification is disturbed, little is known. Benjamin and Miller found that children suffering from thyroid deficiency encounter a disturbance of ossification involving the proximal femoral epiphysis. In cretins the normal epiphyseal plate is replaced by a disc-type zone of solidly calcified cartilage in apposition to a transverse layer of bone. This type of union is incapable of resisting normal stress and is often displaced. Waldenstrom believed that there is a disturbance of ossification at the junction of the epiphyseal cartilage with the metaphysis during puberty. Because of this, the disturbed cells do not hold firmly enough to resist the pressure exerted when weight is borne so that a displacement occurs in the zone of ossification. He stated that the cause of this disturbance is obscure but there may be sufficient endocrine change to effect this appearance without external manifestation. Bernstein and Arens corroborated this theory, and felt that slipped epiphysis is analogous to vertebral epiphysitis and Osgood Schlatter's disease. Snodgrass reported the case of a 15 year old colored boy with slipping of the epiphysis and Osgood Schlatter's disease of concurrent onset.

3. Infectious theory. The support of the infectious theory is rather weak and has few adherents. Ferguson and Howorth, in 1931, stated that they believed that "weakening at the epiphyseal disc is due to vascular stasis about it secondary to sclerotic changes in the soft tissues about the femoral neck. The most probable cause of the sclerotic changes in the soft tissues is a previous, or occasionally concurrent, infection, a subacute arthritis, or, rarely, infection of the neck." Seventy-five per cent of the patients in their series of 70 cases showed mild infections in other parts of the body. Howorth later studied 17 hips in the preslipping stage and 23 hips in the slipping stage, and reported that early the capsule of the hip was edematous and thickened, the periosteum of the neck and synovial membrane were almost always thick, red, softened, and vascular, with a

tendency to pannus formation. The synovial fluid was often increased in amount, and frequently softening of the epiphyseal line could be felt with an instrument. Microscopic examination reveals edema and hypervascularity of the synovia with a collection of round cells about the small blood vessels. Cultures were persistently negative, attributed to technical difficulties or to failure to obtain the culture early enough. He concluded that "the primary condition was a synovitis of the hip during a period of rapid growth, and that this lesion caused circulatory changes in the epiphyseal disc resulting in decalcification and softening." Foley confirmed the findings of Howorth, but brought up the question of whether the synovitis is a result of, or a cause of, the slipping. Balensweig, also a believer in an infectious etiology, believed that there is a metastatic infection in this condition as well as in Legg-Perthes' disease and osteoarthritis, similar to that in hematogenous osteomyelitis, with localization here in the juxtaepiphyseal region. He preferred to call this "osteochondritis of the hip" and believed that in the first decade of life one may have Legg-Perthes' disease, in the second decade, slipped epiphysis, and in the third decade osteoarthritis. Capener reported 2 cases of acute infection with fever at onset, in which intra-articular hemorrhage was later thought to be responsible for the slight temperature elevation, but when first seen infectious metaphysitis was considered.

The opponents of this theory pointed out consistent failure to obtain positive cultures, the general well-being of the patients, absence of fever or other systemic manifestations and normal sedimentation rates.

MECHANICS OF SLIPPED EPIPHYSIS

In order to understand slipping of the epiphysis, it is necessary to review the anatomy and mechanics of the normal hip joint (22, 34). This is a typical ball and socket joint, the head of the femur fitting closely into the acetabulum for an area extending over nearly half a sphere. At the margin the bony cup is still more closely embraced by the glenoidal labrum so that the head is held in place by that ligament even when the fibers of the capsule have been divided. The capsule, which completely invests the head and a large part of the neck, is strengthened anteriorly by the iliofemoral ligament, which curves around the anterior surface of the neck of the femur and the joint, and prevents extension of the lower extremity beyond a straight line with the body. Blood supply reaches the head via vessels running along the neck in reflected portions of the capsule. The major blood supply arises from the medial circumflex artery and lies within the posterosuperior quadrant of the visceral capsule.

This joint can move around three axes: a transverse axis around which extension and flexion occur, a vertical axis for medial and lateral rotation, and a dorsoventral axis for adduction and abduction. The three axes intersect in the center of the head of the femur. The transverse axis lies somewhat anterior to the center of gravity of the body, and, in the erect position, there is a tendency for the pelvis to rotate backward, being checked normally by the tension of the iliofemoral or "Y" ligament. The vertical, or mechanical, axis falls medial to the shaft of the femur as the shaft inclines downward and medially. The dorsoventral axis passes between the margins of the acetabulum and through the center of the femoral head.

The relation of the neck to the shaft is also important in motion at this joint. If it turned directly medially from the shaft, motion at the joint would be angular, and marked change in relation to the articular surfaces of the head and acetabulum would result, for example, in transit from flexion to extension. Actually the neck turns obliquely upward to an approximate angle of 120 degrees, and also has normally about 12 degrees of anteversion so that motion at the joint is always rotatory and gliding as well as angular, and therefore the articular surfaces always remain in close contact.

The direction of thrust of normal body weight when the body is in the erect position is downward, backward, and outward. The head of the femur is set like a cap on the upper convex end of the neck, with the epiphysis looking obliquely upward and medially. When separation occurs, it always is on the diaphyseal side of the epiphysis.

Assume an individual standing erect. He is an overweight adolescent boy who has developed a change in his epiphysis which renders it softer and more friable than normal. As he stands, with the pressure of his weight pushing downward and backward on the head, the head is supported posteriorly by the acetabular margin and locked securely in place anteriorly by the iliofemoral ligament, which blocks any further forward progress of the head. The force is transmitted, therefore, through the epiphysis to the neck. The attachment of the epiphysis posteriorly and inferiorly is supported by a projecting lip or buttress of bone and by the periosteum, which is thicker and stronger here than elsewhere. Anteriorly, however, the periosteum is the only connecting support and is rather thin. Consequently, as Milch has emphasized, the cartilage of the epiphyseal

plate begins to appear wider anteriorly and superiorly, narrowing slightly posteriorly as the neck of the femur assumes a gradually increasing degree of anteversion. Milch felt that, in addition, as the leg is put into eversion during activity, the head follows it as it rotates until the ligamentum teres becomes taut. As the head can no longer follow, if the epiphysis is softer than normal, an acute slipping in the anteroposterior plane occurs at this point, the neck assuming a more anteverted position than the head, therefore rolling out into external rotation. It is only after the neck becomes so anteverted as to be no longer supported by the epiphysis that it begins to slip upward. At this early stage, before upward slipping occurs, X-ray studies disclose the characteristic early widening of the epiphysis. Milch stated that this is only apparent and is actually due to the shadow of the anteverted proximal end of the neck. Kleinberg and Buchman (28), in surgical observation of early cases, have observed the characteristic wedge-shaped deformity of the epiphyseal plate and noted that union with the head and neck still seemed quite firm. Probably both observations are correct as anteversion and slipping occur gradually, with concomitant repair process, so that the epiphysis actually does become widened anteriorly and superiorly at the point of greatest strain.

As the process progresses, the neck becomes more anteverted and the shearing force of body weight plus muscle pull, particularly in hyperextension, or with sudden external rotation force, causes the neck to gradually slip upward and forward on the head with a consequent rise in position of the greater trochanter, and loosening of the iliofemoral ligament, allowing for further external rotation and limitation of abduction by approximation of the trochanter to the side of the pelvis. External rotation is maintained by the external rotators, which are stronger than the internal rotators, and by the altered action of the iliopsoas, which tends to rotate the distal fragment outward when there is separation of the head and neck. As the neck gradually rises, the head may rotate into a position of flexion while the femur, if the head is in its normal position, has a position of hyperextension. The posteroinferior border of the neck in extension may sink into the cancellous part of the head so that the head overlaps the lower and inferior aspect of the neck and produces apparent shortening of the lower margin. On the other hand, the protruding end of the neck superiorly gives the appearance of lengthening and may become rounded off to articulate with the acetabulum. As the metaphysis first rises above the epiphysis, the overlying cartilage becomes thin and bluish; the periosteum is markedly stretched and may become torn; and fracture may occur at the anterosuperior margin of the junction of the epiphysis and metaphysis through the epiphyseal line. Inferiorly the periosteum is rarely disrupted but is torn up from the lower surface of the neck. If rotation of the head occurs, it may be twisted so that its fibers run obliquely upward toward the epiphysis.

All of these changes may occur suddenly in the presence of appropriate trauma, and the epiphysis may suddenly be completely separated from the shaft.

PATHOLOGY

The gross appearance of hip joints involved in this process is easy to understand in view of the above facts. Early there has occurred slight anteversion of the femoral neck, as compared with the normal, opposite side, with a wedging of the epiphyseal plate with its base anteriorly and superiorly The articular cartilage appears normal, and there is no bone atrophy. The lower margin of the neck is normal in length while the upper margin may be slightly longer, due to widening of the epiphyseal plate. In early slipping the cartilage superiorly is thinned along with the periosteum, and bluish, as the cancellous bone shines through. There begins to be a little lengthening of the upper margin. Cartilage of the lower margin appears normal and may begin to overlap the lower posterior margin of the neck so that this appears shortened. Late in the disease the crescent shaped head, with its epiphysis, may have been far forsaken by the upper and anterior surfaces of the end of the metaphysis which have been covered with fibrous tissue and smoothed off to form part of the articulation with the acetabulum which has become egg-shaped to fit. The lower part of the head completely overlaps the lower inferior part of the neck, and fuses with it. The bone of this part of the neck is markedly thickened to withstand the extra strain imposed upon it in the inefficient joint.

The microscopic pathology has not been studied adequately in the very early cases due to the fact that specimens were difficult to obtain at this period. Howorth's studies of 40 hips at a fairly early stage in the process have been mentioned. He attributed the findings to infection. Sutra examined specimens removed at operation and reported "no evidence of rickets, osteomalacia or specific osteitis fibrosa." Kleinberg and Buchman (28), in a study of epiphyses removed early at operation, gave a good description of early changes.

The line of demarcation between bone and cartilage is fairly well preserved, the columnar arrangement of the cartilage persisting, although it is somewhat irregular and the number of cells is reduced. The resting cartilage appears fairly normal, but there are scattered splits and, in some areas, fibrous tissue apparently filling similar splits in an effort at repair. Some of these areas of fibrous tissue are undergoing ossification The osteoid tissue at the junction with the metaphysis is irregularly disposed, as is the newly formed lamellar bone. As the disease progresses the same changes become much more marked until, in advanced stages, the normal characteristics of the cartilage-bone contact zone are completely lost. At that time enchondral ossification has been completely replaced by irregular fibrous bone formation. Areas of degeneration, hemorrhage, and necrosis appear. The authors described the picture as one of a "completely chaotic arrangement of normally functioning cells interspersed here and there with areas of necrosis and areas of hypervascularity."

ROENTGENOGRAPHIC FINDINGS

The roentgenological appearance of the lesion may be predicted from the previous discussion of pathology.

Early or "preslipping stage." Here there is seen only widening and possibly slight irregularity of the epiphyseal line with, a little later, slight rarefaction of the adjacent bone of the metaphysis. Careful comparison should be made to the opposite hip and a lateral roentgenogram of the suspected hip should always be made because often an anteroposterior view is confusing and may not reveal the true extent of the pathology.

Slipping stage. Mayer and Pomeranz (39) reported that the earliest roentgen evidence of slipping of the epiphysis was the disappearance of the slight bulge or "hump" on the upper margin of the head and neck junction, and, conversely, the appearance of a slight prominence of the lower margin. Milch stated that very early, by lateral stereoscopic views, a slight slipping in the anteroposterior plane could be demonstrated before any upward displacement occurred. He pointed to the subcapital shadow, which, as he demonstrated experimentally in monkeys by loosening their epiphyses and taking roentgenographs of the femurs (in different positions) with known amounts of artificial slipping, is actually the anteverted proximal end of the neck, seen first in profile, and then end-on. The diminution in width of the epiphysis as seen in an anteroposterior view after slipping has occurred is due to the backward rotation of the epiphysis, the posterior and inferior margin of which is often visualized as a dim shadow through the shadow of the neck. Milch, Wilson (57), Kleinberg and Buchman (28), and others have pointed out that the roentgenographic appearance may vary with changes in position of the extremity, and may lead to false belief that reduction of a separation has been obtained when the film is made with the leg in internal rotation, due to superimposition of the shadows of the epiphysis and the anteverted end of the neck.

In traumatic separation of the epiphysis the line may appear hazy because of the presence of hemorrhage.

Late changes. The neck appears shortened and greatly thickened and the outline of the head is very irregular and flattened, and often irregularities due to arthritic changes appear.

CLINICAL MANIFESTATIONS

Key gave a classic description of the clinical manifestations and little can be, or has been, added to this.

The onset of symptoms in this condition may be gradual and insidious or may appear very suddenly, or there may be a sudden exacerbation of previously mild symptoms, occasioned by sudden, acute slipping.

The first symptom is often mild pain in the hip; or, more commonly, on the medial side of the knee. A slight limp may appear intermittently, gradually becoming persistent. The patient may notice unusual fatigue on walking or standing. The pain at first is completely relieved by rest, later becoming more persistent. There may be no history of trauma, or if there is, it is often found that mild symptoms have been present for some time preceding it. Such patients infrequently consult a physician until symptoms have been present for several weeks or even months, simply considering them as "growing pains." Careful examination at this point will usually disclose slight limitation of internal rotation, the patient tending to hold the leg in slight external rotation, and possibly some limitation of abduction. At this early period there may be no other signs than those mentioned, and these are elicited only by very careful comparison with the opposite hip. Widening of the epiphysis is shown in the roentgenogram with no, or slight, separation of the epiphysis. Diagnosis made at this time offers the best opportunity for successful treatment; therefore it is important to stress the fact that any limp in an adolescent, particularly of the body types most commonly affected, should be carefully investigated without delay. Once this process has begun,

there is constant danger of sudden, acute slipping due to a fracture through the weakened epiphyseal line. When this occurs the patient usually has sudden, severe pain in the hip, often accompanied by marked muscle spasm, external rotation of the leg, and marked limitation of all motions.

In those cases in which the gradual process continues, the patient's limp becomes persistent, often with increase of pain, although not necessarily so. The patient notices increasing weakness and fatigability in the affected extremity. Objectively the patient is seen to walk with a decided limp, with the pelvis tilted downward on the affected side and the gluteal fold lower on that side. A mild compensatory scoliosis develops with the lumbar curve toward the affected side. The trochanter is elevated on the affected side, usually lying above Nelaton's line. There is mild to moderate atrophy of the buttock and thigh. No tenderness can be elicited. The leg lies in external rotation and the patient, as he walks, holds it in this position. Internal rotation is sharply limited and there is usually a marked limitation of abduction due to impingement of the trochanter on the pelvic wall. A mild flexion deformity is often present. Active and passive motions are about equal. These patients generally show no other sign of illness of any kind, have no fever, have normal sedimentation rates, and appear quite healthy.

The danger of progressive displacement remains until the epiphyseal cartilage is completely ossified, and is, therefore, present over a period of from 1 to 3 years from the time of onset. After ossification has occurred, there will be no further displacement. Due to irregularities of the displaced head and proximal end of the neck, and the poor fit in the acetabulum, and, possibly, to damaged blood supply occurring in the process, with necrosis of overlying articular cartilages, these patients often develop residual arthritic changes at a variable period after reaching the final stage with healing of the epiphysis. Ghormley and Fairchild pointed out that the many cases of morbus coxae senilis probably represent residuals of old slipped epiphysis.

It has been pointed out by Key and others that the severity of symptoms does not always correspond to the anatomical deformity present, and that each case must be carefully considered individually.

TREATMENT

The variety of procedures employed in the treatment of this condition is evidence of the fact that none is completely satisfactory. It was quite generally agreed, however, that the earlier treatment is begun the greater is the opportunity for success. The importance of early recognition and diagnosis and early institution of therapy was repeatedly emphasized.

In choosing the type of treatment to be instituted, an attempt must be made to determine as well as possible the pathological changes that have occurred. The duration of symptoms, the time since an acute displacement, the age of the patient, x-ray evidence as to the amount of displacement and extent of callus formation, and functional ability of the joint must be considered. For purposes of discussion the disease may be divided into several more or less arbitrary periods.

Preslipping or slight displacement. At this stage there may be present only a widening of the epiphyseal line; or, if slipping has occurred, it is less than three-eighths of an inch or one centimeter. Patients seen during this period show the best results. It has been pointed out by Howorth, Milch, and many others that once changes begin, the epiphysis is likely to undergo premature ossification due to the damage it has sustained. The period required varied considerably in the reports of several authors, but may be as short as 8 to 12 months or slightly less. In some cases, however, it may extend for 2 to 3 years. The patients must be followed, regardless of the type of treatment used, until there is good x-ray evidence of ossification through the epiphysis and firm union between the head and neck. During this entire period they must be carefully protected from any strain likely to produce further slipping at the softened epiphysis.

Conservative treatment may consist of simple rest in bed with freedom from weight-bearing. However, acute slipping occasionally occurs at bed rest. Some authors have advocated rest, with walking permitted on a raised shoe on the sound leg, and crutches, or a caliper brace to avoid weight-bearing. Such a brace with the addition of constant maintenance of internal rotation has been used with better results (32). The danger of added strain on the opposite hip with possible development of a bilateral lesion must be constantly kept in mind. Plaster of paris casts have been used for periods of 2 to 9 months, to maintain a position of abduction and internal rotation. In some cases efforts to avoid the excessive atrophy and tendency to stiffness of the hip have been made by bivalving the casts and using careful physiotherapy.

General measures such as weight reduction, elimination of foci of infection, the correction of

vitamin or mineral imbalances, and other measures directed toward improvement of general health are of value in speeding ossification of the epiphysis.

Because further slipping has frequently been noted to occur while the patient was under conservative treatment (16, 55), and in an attempt to accelerate healing, various surgical procedures have been devised.

Jahss (24) attempted to obtain a premature fusion of the epiphyseal line by hammering of the greater trochanter with a Cotton mallet while there was still fairly good position. Others drilled through the epiphyseal plate from the upper surface of the neck, hoping to obtain better vascularization and earlier fusion. Ferguson and Howorth drilled and added sliver bone grafts or bone pegs through the holes in an attempt at immobilization of the epiphyseal plate. Wilson (57) inserted a Smith-Petersen nail through the trochanter and neck into the head in an effort at fixation to prevent further slipping. He reported 14 cases in which the Smith-Petersen nail was used, with excellent results in 10 cases, after a 4 to 34 month follow-up period. Compere advocated the use of threaded wires instead of the Smith-Petersen nail to secure fixation. Kleinberg and Buchman (28) completely removed the epiphyseal plate.

Stage of gradual slipping. At this point slipping has advanced more than three-eighths of an inch, but there is still union between the head and neck, as the epiphysis is only partially displaced; and there is usually a variable amount of callus formation between the lower margin of the neck and the overlying lower margin of the displaced head, further strengthening the attachment maintained by concomitant fibrous and bony repair in the weakened epiphyseal junction.

Great discussion has arisen as to the necessity or advisability of accurate replacement of the epiphysis. It was generally believed that if not corrected, arthritis is prone to occur as a late sequel. However, a high incidence of similar complications has been reported in patients treated by manipulation, and, especially, by open reductions. Moore felt that any treatment further endangering blood supply to the epiphysis encourages development of changes in the overlying articular cartilage. Ferguson and Howorth stated that "average function is less with greater displacement, but this is partly accounted for by greater traumatism in treating them."

Apparently much of the deformity and limitation of function at this stage is due to muscle spasm, as it has long been known that rest alone will result in improvement of function. Ferguson and Howorth, and Wilson (57) have treated patients with mild displacement conservatively with good results. The only large series reported was that of Moore, who treated mild to moderate displacement by immobilization in casts with no significant residual functional impairment in over 47 per cent of his cases.

Manipulation has been a widely used method of treatment. The most commonly used was the method described by Whitman. It is performed under full anesthesia and consists of forcible flexion and internal rotation followed by abduction of the thigh with simultaneous strong downward traction on the leg. In considering manipulation it must be remembered that leverage is great in this situation because of the long lever arm of the femoral shaft, and as a result pressure is exerted upon the small head. Manipulation must be very careful and gentle if trauma to the articular surface of the head is to be avoided as well as further trauma at the epiphyseal junction and damage to its blood supply. It is obvious that if slipping has progressed for a considerable period of time and repair processes have occurred, rendering the malunion again fairly firm, manipulation will have small chance of success. The period in which good results may be obtained was placed variously at 2 months from onset by Ferguson and Howorth, not over 4 months by Brogden, while Bentzon felt that it would be successful up to 6 months from the onset of symptoms. The amount of displacement and callus formation, as determined by roentgenography, is also a helpful guide. Pomeranz and Sloane (40) have pointed out that x-ray films made following manipulation, with the leg in internal rotation, had given many surgeons a false opinion that reduction had been obtained, whereas actually there was only superimposition of the shadows of head and neck, and the deformity persisted. Waldenstrom was of the opinion that closed reduction under anesthesia should never be done because only a few of the so-called successful reductions showed improvement, and in one-fifth of his patients so treated, aseptic necrosis resulted. Many failures with this treatment have been reported, often with progressive loss of motion, and with pain in the hip following the procedure (1, 14, 16, 27, 40, 42, 43, 44, 48). Good results have been obtained in early cases, best in those with acute, early separations.

Perkins, Wardle, and others advocated traction and have obtained fair results. The question arises as to whether the results with surgical procedures are adequate to justify the attempt at correction of the deformity. Many believed that

they are not, reporting that better function was retained in untreated hips, even with deformity, than in those subjected to surgery, even when good anatomical reposition was obtained. Howorth, in discussing the paper of Ghormley and Fairchild, stated, "when the epiphysis has already slipped the chances of securing a good result are not good regardless of the method of treatment. Any type of reduction is poor treatment because the head must be entirely separated from the neck in order to obtain reduction. And when the head is completely separated from the neck most of the blood supply to the head is completely destroyed, which will result in severe damage. The aim should be to avoid the necessity of an open operation." In general, the more radical the surgical procedure the poorer the end result.

Osteotomy has been performed in an effort to correct deformity of the leg. This may be either subtrochanteric, transtrochanteric, or cuneiform osteotomy of the neck In the latter case great care must be taken to avoid destruction of the blood supply to the head, running in the capsule and synovial covering of the lower margin of the neck. Kleinberg and Buchman (28) reported good results from resection of the epiphyseal plate. Compere reported 14 cases of hips in which a wedge osteotomy of the femoral neck was done and the head fixed to the neck by means of multiple threaded wires. The average follow-up period was 2 years. One patient developed aseptic necrosis of the head, and one patient with bilateral slipping developed ankylosis in both hips. The remainder of the hips showed good results. He advocated a minimum of trauma, and emphasized placing the head in a valgus position in relation to the neck before inserting the threaded wires.

Sudden acute slipping. If patients are seen early after the occurrence of acute slipping, the treatment of choice is gentle, careful manipulation followed by immobilization, as the epiphysis is loose and may be maneuvered back into position. If not seen until repair has begun and malunion has occurred, the problem becomes the same as in the case of advanced, gradual slipping.

Old residual cases. In these cases ossification has been completed in a position of malunion of greater or less degree. Various reconstructive procedures have been performed, the results of which have been generally poor. Conservative, palliative therapy is probably the method of choice.

Assessing the value of different methods of treatment from reports in the literature is somewhat difficult as there is a lack of uniformity in reporting. In some instances the duration of the lesion was not reported prior to treatment, in others the follow-up period was too short, and in still others the degree of slipping was not given. Pomeranz and Sloane (40) have shown that deformity of the head and acetabulum with painful hips may appear as late as 5 years after apparently successful treatment. Many have reported a combination of several forms of therapy, and in some cases it was simply stated that surgery was performed without specifying the procedure.

SUMMARY

Slipping of the capital femoral epiphysis is a condition which occurs during adolescence, probably comprising the most common cause of hip disability with onset in this age group. It is more common in males, with a ratio of 2 to 1, and coincident with the peak of adolescence, appearing somewhat later in males than in females. It occurs most commonly in the "overgrown," obese child or in the unusually tall child who has had a rapid growth in height.

The etiology has not been proved, but probably the condition is due to an interaction of many factors, including anatomical changes at the joint at this period, rendering it more susceptible; poorly understood endocrine changes which may contribute to softening of the cartilage junction; too rapid growth; possible chemical imbalances; and to other changes at adolescence which may in these patients be exaggerated beyond the normal. Trauma is usually the immediate cause of slipping.

The treatment is varied, but its success depends upon the early recognition of the disease. These cases are rarely admitted to the hospital with a correct diagnosis. Our aim must be toward the education of all physicians who see patients of this age group, to consider this diagnosis, to recognize early slight physical signs and roentgen changes by careful comparison of the two hips, and to consider these patients as emergencies, instituting immediate treatment, to be continued with no lapse until closure of the epiphysis occurs and firm bony union is established between the head and neck of the femur.

REFERENCES

1. Badgley, C. E. J. Am. M. Ass., 1929, 92: 355.
2. Balensweig, I. Surg. Gyn. Obst., 1926, 43: 604.
3. Benjamin, B., and Miller, P. Am. J. Dis. Child., 1938, 55: 1189.
4. Bentzon, P. A. K. Acta orthop. scand., 1932, 2: 331.
5. Bernstein, M. A., and Arens, R. A. Radiology, 1929, 9: 497.
6. Bozson, E. J. J. Bone Surg., 1932, 14: 884.
7. Brogden, W. E. J. Bone Surg., 1935, 17: 179.
8. Brousseau. Bull. Soc. anat. Paris, 1867, 42: 283.
9. Bruch, H. Am. J. Dis. Child., 1939, 58: 1001.
10. Idem. J. Pediat., 1941, 18: 36.

11. CAPENER, N. Proc. R. Soc. M., Lond., 1932, 25: 1077.
12. CARRELL, B., and CARRELL, W. B. J. Bone Surg., 1941, 23: 225.
13. COMPERE, C. Principles of surgical treatment of slipped capital femoral epiphysis. Read at the meeting of the Chicago Orthopaedic Society, Chicago, Illinois, October 10, 1947.
14. EIKENBARY, C. F., and LECOCQ, J. F. West. J. Surg., 1932, 40: 432.
15. ELLIS, V. H. Lancet, Lond., 1935, 1: 1440.
16. FERGUSON, A. B., and HOWORTH, M. B. J. Am. M. Ass., 1931, 97: 1867.
17. FOLEY, W. B. Proc. R. Soc. M., Lond., 1946, 39: 201.
18. FORRESTER-BROWN, M. J. Bone Surg., 1935, 23: 256.
19. GHORMLEY, R. K., and FAIRCHILD, R. D. J. Am. M. Ass., 1940, 114: 229.
20. GREEN, W. T. Arch. Surg., 1945, 50: 19.
21. HOWORTH, M. B. Surg. Gyn. Obst., 1941, 73: 723.
22. HUMAN ANATOMY. Peirsol. Vol. 1., 8th ed. Philadelphia: J. B. Lippincott Co., 1918.
23. JAHSS, S. A. J. Bone Surg., 1931, 13: 856.
24. Ibid., 1933, 15: 477.
25. JOHNSTON, J. A. Am. J. Dis. Child., 1940, 39: 287.
26. Idem. Special problems of the adolescent child. Mitchell-Nelson's Textbook of Pediatrics. 4th ed., p. 1310. Philadelphia: W. B. Saunders Co., 1945.
27. KEY, J. A. J. Bone Surg., 1926, 8: 53.
28. KLEINBERG, S., and BUCHMAN, J. J. Am. M. Ass., 1936, 107: 1545.
29. KLEINBERG, S., and FRIEDMAN, E. Bull. Hosp. Joint Dis., N.Y., 1940, 1: 72.
30. MACAUSLAND, A. R. J. Bone Surg., 1935, 17: 353.
31. MAYER, L. J. Bone Surg., 1937, 19: 1046.
32. MILCH, H. J. Bone Surg., 1937, 19: 97.
33. MOORE, R. D. Surg. Gyn. Obst., 1945, 80: 199.
34. Morris' Human Anatomy. Schaeffer. 10th ed. Philadelphia: The Blakiston Co., 1942.
35. MULLER, E. Beitr. klin. Chir., 1888, 4: 137.
36. NEWBURGH, L. H. Arch. Int. M., 1942, 70: 1033.
37. NOBLE, T. P., and HAUSER, E. D. W. Arch. Surg., 1926, 12: 501.
38. PERKINS, G. Brit. M. J., 1932, 1: 55.
39. POMERANZ, M. M. Am. J. Roentg., 1938, 40: 580.
40. POMERANZ, M. M., and SLOANE, M. F. Arch. Surg., 1935, 30: 607.
41. RABINOWITZ, M. S. J. Bone Surg., 1940, 22: 992.
42. SCOTT, W. J. Bone Surg., 1936, 18: 743.
43. SEVER, J. W. N. England M. J., 1934, 211: 1179.
44. SNODGRASS, L. E. Pennsylvania M. J., 1931, 35: 24.
45. SULLIVAN, R. F. Bull. N. England M. Center, 1846, 8: 78.
46. SUTRA, C. J. Arch. Surg., 1935, 31: 345.
47. TAYLOR, V. J. M. Brit. M. J., 1932, 2: 1003.
48. WALDENSTROM, H. Surg. Gyn. Obst., 1940, 71: 198.
49. WALMSLEY, T. J. Bone Surg., 1928, 10: 40.
50. WARDLE, E. N. Brit. J. Surg., 1933, 21: 313.
51. WARKANY, J. Disorders which simulate endocrine disturbances: benign adiposogenital dystrophy of adolescence. Mitchell-Nelson's Textbook of Pediatrics. 4th ed., p. 1153. Philadelphia: W. B. Saunders Co., 1945.
52. WHITMAN, R. Ann. Surg., 1925, 81: 374.
53. WILLIS, T. A. J. Bone Surg., 1929, 27: 779.
54. WILSON, J. D. J. Bone Surg., 1940, 22: 531.
55. WILSON, P. D. J. Am. M. Ass., 1924, 97: 1867.
56. Idem. Surg. Clin. N. America, 1936, 16: 733.
57. Idem. J. Bone Surg., 1938, 20: 379.
58. WOLCOTT, E. W. Surg. Gyn. Obst., 1943, 77:.61.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Nature of Aqueous Humor. SIR STEWART DUKE-ELDER. *J. Am. M. Ass.*, 1948, 137: 1285.

Though the aqueous cannot be completely described by the mathematics of dialysis, it is certainly not, in the generally accepted sense of the word, a secretion. Cogan and Kinsey, using heavy water as a tracer, have shown a free two-way transference of water between blood and the intraocular fluids, and conclude that the water in the aqueous is renewed every 3 minutes. Friedenwald finds the current in Schlemm's canal is 1 to 2 cm. per minute and suggests a unidirectional permeability in the ciliary body through differences in oxidation-reduction potential maintained by enzyme systems.

The experimental fact remains that the concentration of ions in the aqueous approaches a dialysate even more than other undoubted dialysates such as ascitic fluid. Slight deviations are susceptible of explanation. For example, the change in carbon dioxide tension accounts for a difference of 1.5 per cent between the plasma chloride concentrations of arterial and venous blood.

The glucose in the aqueous is less than that of the blood by the amount utilized in the metabolism of lens and retina. It rises in the aphakic eye. Different sugars enter the aqueous in proportion to the size of the molecules. The disaccharide, sucrose, penetrates much more slowly than glucose, and the trisaccharide, affinose, not at all.

Observation of radioactive isotopes shows that the most rapid entry into the anterior chamber is through the iris. Glucose penetrates the posterior segment at only one-third the rate at which it reaches the anterior chamber, sucrose at one-seventeenth. The iris acts apparently like an inert diffusing membrane, while the membrane in the posterior segment seems more selective.

Urea, creatinine, alanine, and glycine enter the eye more slowly than the larger moleculed sugars. The blood-aqueous barrier is individualistic, and each constituent is treated in a characteristic way.

There are, then, at least two mechanisms—a simple traffic through the iris, mainly into the anterior chamber, and a more discriminating one in the posterior segment. JAMES E. LEBENSOHN, M.D.

Intravitreous Streptomycin: Its Toxicity and Diffusion. P. A. GARDINER, I. C. MICHAELSON, R. J. W. REES, AND J. M. ROBSON. *Brit. J. Ophth.*, 1948, 32: 449.

The author injected streptomycin subconjunctivally and intravitreally in a series of rabbits' eyes and found:

1. Streptomycin injected into the vitreous of rabbits' eyes was diffused slowly throughout the eye, but had a deleterious effect on the retina. This was seen grossly and histologically.
2. Streptomycin injected subconjunctivally was not toxic to the eye but diffused rapidly out of the ocular tissue. EARL H. MERZ, M.D.

Craterlike Holes in the Optic Disc. EMANUEL ROSEN. *Brit. J. Ophth.*, 1948, 32: 465.

The author presents 7 cases of craterlike holes in the optic disc. He warns against confusing the diagnosis with glaucoma, since some patients have field defects, iris atrophy, and pupillary inequalities. The cause for these pits is not known but it is possible that they are of congenital origin.

EARL H. MERZ M.D.

The Treatment of Severe Infected Corneal Ulcers by Subconjunctival Injection of Penicillin Twice Daily without Hospitalization; with a Short Review of Other Methods. KAMEL RIZK. *Brit. J. Ophth.*, 1948, 32: 497.

The author presents a method of using penicillin subconjunctivally, twice a day, 10,000 units at a time, in 0.5 c.c. of 1 per cent novocain solution, for the treatment of corneal ulcers. The treatment was usually completed in a period of 5 days with excellent results.

This treatment was more practical, more efficient, and more economical than the intramuscular use, instillation method, or subconjunctival injection every 4 to 6 hours.

The use of penicillin was then compared with older methods of treatment and found to be much better.

EARL H. MERZ, M.D.

Post-Traumatic Granuloma of the Orbit. G. STUART RAMSEY, H. WYATT LAWS, J. E. PRITCHARD, and HAROLD ELLIOTT. *Canad. M. Ass. J.*, 1948, 59: 206.

Two cases of post-traumatic granuloma of the bony orbit, simulating tumor, are presented. A third case shows the identical pathological process in a rib. The literature contains only two previous instances of this rare condition.

The first case was that of a laborer, 57 years of age. In 1943 his right supraorbital area struck the pavement in an automobile accident, with a proptosis of the right eye. X-ray examination showed a comminuted fracture of the margin of the right orbital fossa. Seven months later a tumor mass was noted fixed to the right frontal bone. The corrected vision was R. 20/25; L. 20/20; exophthalmometer, R. 19 mm., L. 12 mm.; R. hypophoria of 5 prism diopters. A right supraorbital craniotomy revealed a tumor,

3 cm. in diameter, that occupied the lateral two-thirds of the right supraorbital ridge and pushed the eyeball down and in. An uneventful postoperative course followed its removal. The specimen was pathologically diagnosed as a chronic granuloma sequential to organization of an old hematoma.

The second case was that of a chauffeur, aged 44. In 1934, he was struck on the left temporal region near the orbit. In 1946 he noted a swelling about the left eye, proptosis, and diplopia, and a mass could be felt in the upper, outer corner of the orbit. X-ray examination showed a concentric, expanding lesion with rarefaction of the left frontal bone. At operation, the affected bone which included the orbital margin, the superior orbital plate, and the floor of the anterior fossa, was removed. The dead space was filled with fibrin foam and the wound was closed. A month later the fronto-orbital defect was repaired with a tantalum cranioplasty. In the final examination, vision was R. 20/20 and L. 20/20; left hypophoria of 4 prism diopters; no exophthalmos; and no ocular complaints.

Radiologically the post-traumatic granuloma simulates any osteolytic lesion involving the frontal bone. Surgically, they are cured by radical therapy. Pathologically, the essential lesion is a chronic granuloma composed of granulation tissue containing abundant hematogenous pigment, multinucleated giant cells, cholesterin crystals, many fat-laden phagocytes, and a variable degree of fibrosis. When a hematoma occurs in a bone, the broken down blood may act as a foreign body with a consequent slow, steady reaction over several years.

JAMES E. LEBENSOHN, M.D.

Removal of an Orbital Tumor through the Inferior Route with Kuhnt-Szymanowski Repair of Ectropion. ALSTON CALLAHAN. *South. M. J.*, 1948, 41: 790.

A tumor mass that can be palpated over the infraorbital rim is best removed through an incision over the infraorbital rim, and this method was used in the following case.

A woman, aged 68, had noted proptosis of the left eye over a period of 27 years, and in the last year the eye had become red and painful, with profuse discharge, and totally blind. Deep palpation between the eye and the infraorbital rim revealed a firm mass. An incision was made across the lateral half of the left lower lid and the orbital septum was then divided, care being taken to avoid injury to the lateral canthus, the infraorbital nerve and vessels, and the origin of the inferior oblique muscle. The tumor was removed by finger dissection without injury to the ocular muscles, and measured 3 cm. in diameter. The eye then returned to its normal position. The orbital septum was closed with chromic catgut, and the skin was closed with silk. Microscopic examination of the tumor proved it to be a hemangioma. Ectropion of the lower lid persisted and was corrected 6 months later by the classic Kuhnt-Szymanowski operation. JAMES E. LEBENSOHN, M.D.

Clinical Course of Glaucoma. ADOLPH POSNER AND ABRAHAM SCHLOSSMAN. *Am. J. Ophth.*, 1948, 31: 915.

The present study is a correlation of 474 cases of glaucoma from private practice. In 373 patients the condition was primary. One hundred and fifty-eight patients have been followed for 5 years or longer. There were 71 eyes with acute congestive glaucoma, 140 eyes with chronic congestive glaucoma, and 422 eyes with chronic simple glaucoma.

The authors attempt to consider the problem from a purely clinical point of view. Comparison of an isolated case of acute congestive glaucoma in which cure has been effected by surgical treatment, with a case of asymptomatic chronic simple glaucoma in which the tension is within normal limits or only slightly elevated, would seem to indicate that these are two separate diseases. However, the authors state that analysis of a large number of cases invariably reveals gradations in the symptomatology and course to such an extent that a sharp line of demarcation cannot be drawn at any point in the series. Furthermore, there is a mixed group of cases in which one may find either a congestive glaucoma in one eye and a chronic simple glaucoma in the other eye, or a chronic simple glaucoma with acute exacerbations in one or both eyes. Additional evidence for assuming a unitary concept of primary glaucoma is found in a study of hereditary cases. In the same family tree, one may find examples of congestive and chronic simple glaucoma.

Glaucoma should be regarded as a constitutional disease in the sense of a dysfunction of the central regulatory mechanism of the autonomic nervous system, similar to the metabolic disorders such as diabetes, hypertension, and obesity. It is possible that this dysfunction constitutes the primary, or at least the predisposing, cause while the various anatomic and physicochemical conditions of the eye are modifying or precipitating factors. The fact that congestive glaucoma occurs in a small percentage of eyes with narrow angles and that this disease may also occur in eyes with wide angles tends to indicate that the angle plays a secondary role in the etiology of the disease.

The authors believe that although tension undoubtedly plays an important role in glaucoma, there may be other factors which contribute to the cause of the disease. The following possibilities are suggested: (1) disturbance of the central autonomic nervous system (may include psychosomatic factors); (2) vasomotor instability; (3) hereditary factors; (4) arteriosclerosis (either general or local); (5) blood pressure; (6) metabolic disturbances (diabetes, obesity, endocrine); (7) relation of intracranial to intraocular pressure; (8) degenerative changes in the nervous tissue; (a) lacunary degeneration in the brain and nerve, (b) Schnabel's cavernous atrophy; and (9) local factors: (a) anatomic (Schlemm's canal, chamber angle, retinal circulation, choroid and so forth), (b) nutritional, (c) congenital, and (d) physicochemical factors such as increased

capillary permeability, and diminution in cholinergic substance.

In 60 per cent of the cases of primary glaucoma, the onset occurred between 41 and 60 years of age. Fifty patients showed hereditary tendencies. The pedigrees studied exhibited dominant inheritance.

MICHEL LOUTFALLAH, M.D.

Green Spectacles Prescribed in Glaucoma. R. B. ZARETSKAYA. *Am. J. Ophth.*, 1948, 31: 985.

It has been shown that the illumination of an eye with green light resulted in the lowering of the intraocular pressure in the other eye, this effect being especially pronounced in glaucomatous eyes. It seemed natural, therefore, to test the use of green spectacles as a means tending to reduce intraocular pressure. Experiments were carried out on 19 subjects, with a period of observation varying between 12 to 15 days for hospitalized patients and 30 or more days for outpatients.

From an analysis of curves obtained, it may be said that notwithstanding the total suspension of pilocarpine medication the intraocular pressure showed a pronounced tendency to decrease in patients wearing green spectacles; the range of fluctuations of intraocular pressure during the day was likewise found to decrease. An appreciable effect was obtained when the use of green spectacles was combined with the administration of very small doses of pilocarpine (0.5 per cent solution twice daily). The decrease in intraocular pressure was much more striking, however, in certain cases in which the use of green spectacles was combined with small doses of adrenalin.

Green light, while acting upon the color receptor of our vision, produces a definite rearrangement in the vegetative nervous system, thus also affecting the neurovascular apparatus of the eye. We may assume that the amounts of acetylcholine and sympathin in the eye are different according to whether the eye is exposed to red or green light.

The encouraging results of the experiments cause the author to believe that the use of green spectacles may, in certain forms of glaucoma, prove a helpful therapeutic procedure, especially if prescribed along with small doses of adrenalin or pilocarpine.

MICHEL LOUTFALLAH, M.D.

Beta Irradiation in Glaucoma. GEORGE M. HAIK, L. A. BREFFEILH, AND AELETA BARBER. *Am. J. Ophth.*, 1948, 31: 945.

The authors conducted a series of experiments in which beta irradiation was applied to the ciliary body of rabbits in varying amounts over varying periods of time, in an endeavor to determine the practicability of treating glaucoma by obliteration of the vascular supply of the ciliary body, with the objective of bringing about a decrease in the production of intraocular fluid. The experiments reported were planned in the light of changes in the vascular endothelium, leading to proliferation and various degrees of occlusion of the lumen, which have been reported after beta radiation, and which are most marked in the endothelium. While vascular changes were achieved in the majority of cases, damage to the lens also resulted in almost every instance in which the desired changes were accomplished.

The proposed method seems theoretically sound; however, to make it practical, a dosage of radium must be established which will bring about the desired changes in the ciliary body without damaging the lens at the same time. Probably this objective could be accomplished if an applicator were available which would permit the emanation of beta rays but would screen out gamma rays.

A clinical case is presented in which irradiation was employed because the state of the eye was already practically hopeless. Apparently the treatment has produced no ill effects, but the therapeutic results are still inconclusive.

MICHEL LOUTFALLAH, M.D.

Operative Failures for Chronic Glaucoma. BRITTAIN F. PAYNE. *Am. J. Ophth.*, 1948, 31: 965.

A study of eyes removed after operative failures for chronic simple glaucoma shows that ideal surgical relief has not been devised so far as the laboratory is concerned. The examination of approximately 100 eyes operated upon for glaucoma, at the New York Eye and Ear Infirmary, showed at least three characteristics: (1) adhesions between the iris and the cornea; (2) closure of new filtration channels with fibrosis; and (3) inflammation of the uvea. Synechias between the anterior surface of the iris and the posterior surface of the cornea are composed of such dense connective tissue that permanent separation by operation is almost impossible. The artificial filtration channel, or channels, become closed by the proliferation of connective tissue despite an iris inclusion in the operative wound. Progressive iridocyclitis usually requires enucleation. Operations for glaucoma performed on globes sent to the laboratory are iridectomy, iridencleisis, and trephination.

Common pathologic changes are present in eyes removed after operative failures for chronic simple glaucoma. A comparison of the histology of normal eyes with that of chronic simple glaucoma may reveal the causes of operative failures. Failure of iridectomy may be due to the persistence of synechias and to failure to remove the iris at its roots. In iris-inclusion operations, the iris itself may produce closure and in trephinations, closure may occur as the result of fibrotic and inflammatory changes.

MICHEL LOUTFALLAH, M.D.

EAR

Blast Injuries of the Ears. OREL FRIEDMAN. *Arch. Otolar.*, Chic., 1948, 47: 471.

The concussion or blast produced by the high explosives used in modern warfare is greatly injurious to the auditory apparatus. This fact quickly became obvious to an otolaryngologist treating battle casualties in World War II. On service in one of the

United States Army general hospitals in England, more patients were seen with blast injury of the ears than with any other injury or disease.

The studies reported here were made on 100 patients with acoustic trauma, admitted to this general hospital in the first 6 months after invasion of the European Continent in June, 1944. These were the first 100 patients who could be adequately studied, although many others were seen and treated during this period. The patients not included in this series were eliminated because of other injuries which prevented audiometric examination or because they were under observation for too short a time. Many of these patients were seen within 1 week of injury, but none before the third day. Some of them remained under observation for as long as 3 months. The findings in these men were deafness, tinnitus, interstitial hemorrhage and rupture of the tympanic membrane, and acute suppurative otitis media.

Whispered voice tests and audiometric studies were done on all these patients and were repeated at intervals, to follow their progress. A rough determination of the acuity of hearing for speech can be obtained by the whispered voice test. Audiometry is a much more accurate method evaluating and following changes in the loss of hearing for sound. This is borne out by a comparison of the findings, by audiometry, with those obtained by whispered voice and tuning fork tests.

A history of aural disease which existed prior to the blast injury was given by 22 of these patients. Six had total unilateral deafness, 11 had partial deafness, and 9 had healed acute suppurative otitis media. Four gave a history of both deafness and previous aural suppuration.

Seventy per cent of the injuries were caused by high explosive shells. In some cases there had been repeated exposure to blast and heavy firing, but no acute injury occurred.

The impairment of hearing was severe in 14 patients, moderate in 15, and slight in 71.

Prophylaxis. No satisfactory mechanical method of protecting the ears against blast injuries was in common use in World War II. None of the patients whose cases are reported used any means of protection. The reasons given for this neglect were summed up by Guild, who stated that (1) dry cotton is ineffective in stopping even moderately intense detonation waves, and that (2) cotton soaked with oil or petrolatum and solid obturators are entirely unsuitable for use by those whose duties require that they be able to hear ordinary sounds well at all times.

Tinnitus. Inflation of the eustachian tube did not influence the tinnitus. No specific therapy was used in treating patients for this symptom.

Rupture of the tympanic membrane. Most of the smaller perforations healed without intervention. Occasionally it was necessary to stimulate the margins of the perforation by mild scarifying or by applying 10 per cent silver nitrate to the margins of the perforation to stimulate healing. Marginal perforations appeared to close more slowly than the others. Large perforations with damage of the ossicles showed no tendency to heal. Most of the perforations that healed did so in less than 1 month.

Acute suppurative otitis media. The prophylactic treatment impressed on the medical officers in the forward areas was the preventing of contamination of the ears by absolute avoidance of syringing or of applying "drops" to the ears. Not one of the patients in this series received injudicious aural therapy in the forward areas. The patients themselves had to be instructed not to contaminate their ears. In the presence of a dry traumatic perforation, none of the sulfonamide powders was insufflated, because it was felt that there was no advantage to be gained. Many of the patients had other injuries and were treated with sulfadiazine or penicillin, or both, a short time after being injured.

The active treatment was a daily cleansing of the infected ear with hydrogen peroxide and dry wipes, followed by instillation of one of the following local medicaments: sulfathiazole sodium solution (5 per cent), penicillin solution (containing 1,000 units per cubic centimeter), sulfanilamide powder, or 2 per cent boric acid in alcohol. Sulfadiazine or penicillin was frequently used systemically, in addition to the local therapy. These infections responded rapidly to treatment. In none of the patients did acute mastoiditis or other complications develop.

Thirteen case histories are reported, accompanied by their audiometer charts. JOHN F. DELPH, M.D.

A Newer Concept of the Management of Otogenic Infection. MERRILL B. HAYES and C. FREMONT HALL. *Arch. Otolar.*, Chic., 1948, 47: 289.

The authors believe that otologic infections in temperate zones can be divided into a winter phase during which gram positive organisms predominate, and a summer phase during which gram negative organisms predominate as the infecting agent. In the former type, treatment has been practiced successfully with penicillin and other antibiotics. In the treatment of the latter, difficulty has been encountered by many and, in the past, has not been successful. In an attempt to improve the treatment of gram negative otologic infections, the authors studied a group of 100 cases exhibiting acute otitis media, chronic suppurative otitis media, and otitis externa. In many of these, particularly in patients with otitis externa, the usual forms of treatment brought about the disappearance, from the culture, of all bacteria except from the gram negative Pseudomonas aeruginosa (Bacillus pyocyaneous) and Bacillus proteus types.

After trying many compounds, the authors found in the early part of their study that the most effective compound against the gram negative bacteria was monobromosaligenin. Later, dibromosalicylaldehyde was found to be equally as efficacious as monobromsaligenin and, in addition, this drug was active against fungi; dibromosalicylaldehyde was considered the drug of choice. The two substances were used locally as a powder or ointment, or in solu-

tion, as adjuncts to penicillin and the sulfonamides. Streptomycin was not used. Eight tables are given.

JOHN J. BALLENGER, M.D.

Bone-Dust-Free Lempert Fenestra Nov-Ovalis: A New Evolutionary Development of the Surgical Treatment of Clinical Otosclerosis. JULIUS LEMPERT. *Arch. Otolar.*, Chic., 1948, 47: 280.

In the surgical treatment of clinical otosclerosis, bone sand and bone splinters have always been the by-products of fenestrating the bone labyrinthine capsule with the electrically driven burr. When the final endosteal bony layer in this operation is fractured inward, the author believes that bone dust and splinters are almost invariably lost within the perilymphatic space and their presence there enhances the tendency to osteogenesis that exists at the fenestral rim. Failure to remove these particles, according to the author, may lead to postoperative closure of the fistula. However, he points out that attempts at removing the bone splinters may inadvertently involve injury to either the perilymphatic trabecular blood vessels, with resultant hemorrhage in the perilymphatic space, or to the endolymphatic labyrinth.

At the time of re-operation in cases in which the gain in hearing was not maintained, the author observed new bone formation involving the fenestral rim or involving both the fenestral rim and the perilymphatic space. He reasoned, hypothetically, that perhaps the perilymphatic endosteal osteogenetic process which he observed in the human subject had been initiated by bone fragments that found their way unnoticed into the perilymphatic space. In order to avoid such an occurrence, a technique for fenestrating the surgical dome of the vestibule without creating bone splinters and dust was evolved. This is done by removing the bony surgical dome of the vestibule until only the endosteal bony layer remains. An incision is then made through the endosteal bone to outline the fistula. The cap thus created is everted and removed intact, exposing the endolymphatic labyrinth. Finally the fenestral rim is burnished with a lead burr. In this way, the author believes, injury to the endolymphatic labyrinth and perilymphatic trabeculae is avoided, and the formation of bone dust and splinters is also avoided.

Ten figures of microscopic sections, and a number of drawings are included.

JOHN J. BALLENGER, M.D.

Chorda Tympani Nerve Graft: A Preliminary Report of a New Technique Used in Surgical Fenestration of the Labyrinth. SAMUEL ROSEN. *Arch. Otolar.*, Chic., 1948, 47: 428.

Otologists are indebted to Lempert for the first practical one-stage technique for the surgical treatment of clinical otosclerosis. However, significant numbers of failures continue to be a challenge to the surgical techniques developed therefrom. The two most important causes of failure appear to be bony or fibrotic closure of the fenestra and postoperative membranous labyrinthitis of varying degrees. Analysis of these factors had led Lempert and Shambaugh to introduce modifications of the fenestration technique in an attempt to increase the percentage of successful cases. Possibly the amount of auditory improvement could be increased to an even higher level in successful cases if the degree and the duration of the postoperative labyrinthitis could be diminished.

The chorda tympani nerve is liberated from its attachment to the facial nerve and is placed over the fenestra to protect the membranous labyrinth and the perilymphatic space from the untoward effects of blood and inflammatory products coming mostly from the overlying tympanomeatal flap. The chorda seems eminently suited to play the role of protective barrier to the delicate labyrinth since it withstands successfully all degrees of acute purulent otitis media to which it is exposed. Taste on the anterior two-thirds of the tongue is not affected in acute purulent otitis media. It is interesting to note that in its tympanic course the chorda tympani nerve is covered with mucous membrane.

A myringotomy knife is inserted between the chorda tympani nerve and the inner surface of the tympanic membrane. The blunt edge of the knife is swept upward beyond the point at which the chorda is attached to the neck of the malleus. In a similar manner the myringotomy knife is swept downward to the region where the chorda enters its bony canal. The chorda, covered by mucosa, is then grasped with a jeweler's tweezers about 3 to 5 mm. below the malleus. Traction upward with the tweezers is continued until the chorda is pulled out of its bony canal. The free length of the chorda is then placed safely in the tympanum until the fenestra nov-ovalis is completed. Then the chorda is placed over the middle of the length of the fenestra from above downward. In this position the chorda tympani lies on the delicate membranous labyrinth with only the very slightest perilymphatic space visible on each side of the nerve. As the chorda is being pulled out of its canal, great care is necessary to avoid tearing it before its free end is long enough to reach and cover the fenestra. When the chorda has been completely evulsed from its attachment to the facial nerve it may be long enough to be looped back up alongside and parallel to the descending portion of the chorda. This double length of chorda tympani covers the fenestra completely. The tympanomeatal flap is then put in place.

Eight cases are reported. Within 2 weeks after the operation, all patients had a decibel loss of 25 or less. Hearing continued to improve rapidly, and by the fifth week following operation the majority had a decibel loss of 15 or less. This level of hearing has been maintained or improved to date.

Thus far osteogenic closure of the fenestra has not occurred in any case. It is too early to predict to what degree, if any, the chorda tympani graft may succeed in preventing osteogenesis.

The article is illustrated with 4 figures and 3 tables.

JOHN F. DELPH, M.D.

PHARYNX

The Uvula: Its Structure and Function and Its Importance. GEORGE S. RICHARDSON and E. MARKEY PULLEN. *Arch. Otolar.*, Chic., 1948, 47: 379.

On the whole, there is no structure within the confines of the body so little understood and so often abused and maligned as the uvula. This structure's function appears in the literature in only the briefest fashion. The uvula has been classed with vestigial structures, such as the vermiform appendix.

In the present article, the authors delve deeply into the anatomy of the nose and soft palate as related to the uvula. This is illustrated by 4 anatomical drawings by one of the authors.

The functions of the uvula are summarized as follows:

It massages and moistens the cellular structure of the posterior pharyngeal wall; it aids in the removing of material from the posterior pharyngeal wall and in the passing of this material downward to the hypopharynx and the base of the tongue; it serves as a transfer organ to bridge the deficiency between the velum and the posterior pharyngeal wall as secretion moves from the midline above and anteriorly to the midline posteriorly; it is a valuable aid in preventing middle ear disease in children; by participating in the preservation of normal pharyngeal arches, the uvula prevents pharyngitis sicca with subsequent drying of the eustachian orifices, as might be expected with a high arch on one side or with a fibrous straight line contracture; it is the warning flag of the pharynx in many instances; it prevents rhinolalia aperta in successful tonsillectomy and is a valuable adjunct to voice control, possibly as a midline buttress, particularly in singers. This function is of little value in the speaking ranges apart from preventing unpleasant qualities; a uvula deviating to one or the other side may indicate a weakness of the accessory nerve on the opposite side.

The conclusions reached are as follows:

The uvula is a valuable means of preserving and detecting nasopharyngeal health and change. It should not be traumatized needlessly, nor should it be subjected to operation unless a definite syndrome traceable to it is evidenced.

More must be known about the eustachian tube and its nasopharyngeal orifice before one becomes willing to sacrifice a uvula, or to class it as a vestigial remnant. To ignore an edematous uvula is as negligent as to ignore chronic hoarseness without ascertaining the state of the vocal cords by viewing the anterior commissure in indirect laryngoscopy.

Case histories are presented to illustrate certain points in the text, such as the influence of the uvula on the health of the nasopharynx and its influence in reinforcing the soft palate in voice control.

JOHN F. DELPH, M.D.

NECK

Lymphadenoid Goiter. H. M. GOLDBERG and J. DAVSON. *Brit. J. Surg.*, 1948, 36: 41.

The authors endeavored to find out, first, whether it is possible to differentiate clearly between thyrotoxicosis or simple goiter with lymphocytic infiltration on the one hand, and lymphadenoid goiter on the other; and, secondly, to determine whether a study of the relationship between the two conditions can throw any light on the etiology and development of lymphadenoid goiter.

They conclude that no sharp dividing line can be drawn on histological grounds between toxic goiter with lymphoid infiltration and established lymphadenoid goiter; the differences appear to be essentially ones of degree.

They further believe their study has shown that focal changes histologically indistinguishable from those seen in the various stages of lymphadenoid goiter can very frequently be found in the rim of thyroid tissue immediately surrounding an area of adenomatous hyperplasia, and also immediately beneath the fibrous tissue capsule of the gland. Both locations are sites where compression of thyroid acini would be liable to occur as the result of increase in size of part or whole of the gland. They believe it is reasonable to conclude that the changes are secondary to local ischemia, and it is suggested that the widespread changes occurring in lymphadenoid goiter are similarly due to ischemia, probably a relative ischemia due to the blood supply being insufficient to meet the increased demands created by the stimulation of the thyroid epithelium by the thyrotropic hormone. The fact that the changes are never seen inside an area of adenomatous hyperplasia, which for its growth and maintenance depends on an adequate blood supply, is considered further support for the ischemic causation of the lymphadenoid changes.

EARL O. LATIMER, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Tantalum in the Repair of Traumatic Skull Defects. WALPOLE LEWIN, M. P. GRAHAM, and G. B. NORTHCROFT. *Brit. J. Surg.*, 1948, 36: 26.

A comprehensive review is given of 128 cases in which tantalum cranioplasty was performed, and a 2 year follow-up on 124 of these patients is included. The indications for repair, the preparation of the plate, and the operative technique are considered for each type of case; however, the discussion of the results obtained is perhaps of greatest interest.

Uncomplicated postoperative convalescence was observed in 110 of the 128 patients, with no immediate mortality. Persistent collections of spinal fluid beneath the scalp were noted in 3 patients, pressure necrosis with scalp infection occurred in 1 patient, coliform meningitis developed in 1, and in 3 patients with associated frontal defects, the cosmetic effect was poor. Ten patients developed epilepsy within 2 weeks after operation, half of whom had had preoperative seizures.

Late results were judged primarily on the basis of answers 124 patients gave to a questionnaire, or on the basis of a supplementary letter from the patient's physician. Three patients died within the follow-up period. One had developed status epilepticus and died shortly after the removal of the plate; a second presumably died of recurrent meningitis in a mental hospital 1 year after plating, and a third succumbed to pneumonia unassociated with his cranioplasty.

Removal of 11 plates had to be carried out. In 2 cases, this was because of poor cosmetic results; 5 were removed because of infection; and 4, because of intracranial complications. The authors point out that the one-stage preformed plate method has definite limitations in the frontal regions, for of the 68 patients with defects in this area, 8 were regarded as having an unsatisfactory result. Only 3 of these cases were thought to be complete failures, however. In all, only 7 per cent of the patients reported any local discomfort or pain as far as the plate itself was concerned.

Infection in the original wound had caused delayed healing in 31 patients in the series.

After evaluating these cases it was the authors' opinion that with proper chemotherapy, repair of infected wounds can be safely carried out 3 months after final healing of the wound. The incidence of infective complications referable to the tantalum plate was 7 per cent, but when the plate was related to a defect in the frontal sinus there was an additional 9 per cent risk in infection. Intracranial complications required removal of the plate in 4 cases. In one of these there was an underlying abscess; in 3 others symptoms were due to hydrocephalus. In this latter group there was the suggestion that tantalum in contact with the ventricular system may actually stimulate the production of cerebrospinal fluid, hence close attention must be paid to repairing all dural tears or defects. Fifty-one of the patients had had convulsive seizures, and the only ones in this series who showed improvement in their epilepsy were those on whom an intracerebral operation had been performed in association with the cranioplasty. A very complete discussion of late sequelae is presented and numerous interesting cases are cited in detail.

RICHARD C. SCHNEIDER, M.D.

Differential Diagnosis of Tumors at the Cerebellopontile Recess. ANTONIO GONZALEZ REVILLA. *Bull. Johns Hopkins Hosp.*, 1948, 83: 187.

The author presents a review of 205 tumors of the cerebellopontile recess observed at the Johns Hopkins Hospital, Baltimore, from 1926–1945, and verified at operation. Seventy-eight per cent of these tumors were acoustic neuromas. The remainder were cholesteatomas, meningiomas, gliomas, abscesses, and miscellaneous tumors such as sarcomas of the meninges, malignant melanomas, and carotid body tumors. The relationship of angle tumors to pain similar to that present in idiopathic trigeminal neuralgia is discussed.

It was found that the meningiomas occurred in a higher age group, that the seventh nerve is more commonly affected, and that radiographic erosion of the internal acoustic meatus is more rare in the presence of meningioma of the angle than when an acoustic neuroma is present.

Cholesteatomas are more apt to appear in a young age group, the duration of symptoms is longer, and the resulting headaches are not as severe as those of an acoustic neuroma.

Acoustic neuromas are more likely to produce severe unilateral seventh and eighth nerve changes than do the gliomas, but differentiation between an angle neuroma and a glioma is frequently difficult.

The abscesses usually are accompanied by an otitic history or the presence of a known pyogenic focus elsewhere in the body. Frequently, Gradenigo's syndrome may precede the symptoms of an abscess in the angle.

The metastatic lesions are apt to occur in older individuals; the neurological symptoms are usually more widespread, and especially does the rather late appearance of the patient's difficulties exclude a tumor arising within the eighth nerve.

JOHN MARTIN, M.D.

The Operation of Prefrontal Leucotomy. E. CUNNINGHAM DAX and E. J. RADLEY-SMITH. *Brit. J. Surg.*, 1948, 36: 74.

The authors describe the various approaches and techniques of prefrontal lobotomy devised by a

number of British and American authors since this surgical procedure was first used by Moniz and Lima, in 1936. They perfected 7 different types of bilateral incision in the frontal lobes made by an approach through the temporal fossa. The opening in the skull is situated 3 cm. behind the lateral orbital margin and 3 cm. above the zygoma, allowing identification of the area of the brain exposed by the position of the Sylvian vessels. The authors use the MacGregor-Crumbie leucotome and claim to be able to perform smaller and more selective leucotomies. They state that their upper incision of the white matter leads to improvement in patients with psychomotor activity, and suggest orbital leucotomy in the passive and emotional states. GEORGE PERRET, M.D.

Cushing's Disease with a Hyperplastic Basophil Cell Tumor of the Hypophysis (Maladie de Cushing avec tumeur hyperplasique a cellules basophiles de l'hypophyse). HENRI METZGER, LOUIS FRUHLING, and MARGUERITE MESCHENMOSER. *Ann. endocr.*, Par., 1948, 9: 35.

This article is really a case report of a 52 year old single woman with symptoms pointing to a Cushing syndrome, in whom a complete postmortem examination was carried out. There was a small tumor in the anterior lobe of the pituitary gland which was composed principally of basophil cells. The patient had menstruated regularly up to the age of 50 years. She was small in stature and had a round hirsute face with bilateral exophthalmos. She had a heavy abdomen and thin tapering extremities. Her chief complaint was cramps in the legs when walking. The blood pressure was 220/180 and the electrocardiogram showed there was severe left ventricular strain. There was some kyphosis in the thoracic spine. The posterior clinoid processes were destroyed. In addition to the findings in the hypophysis there was evidence in the kidneys of a malignant nephrosclerosis.

The author distinguishes between Cushing's disease and Cushing's syndrome. The syndrome can be produced by extrapituitary lesions such as adrenocortical tumors or tumors of the thymus or ovary. The bibliography is very small and does not entirely cover the work of the authors quoted.

ADRIEN VER BRUGGHEN, M.D.

SPINAL CORD AND ITS COVERINGS

A Contribution to the Knowledge of the Conus and Filum Ependymoma. LENNART ZETTERGREN. *Upsala läk. fören. förh.*, 1948, 1: 11.

Quoting reports from the Mayo Clinic, the author states that approximately every fifth tumor of the central nervous system is a spinal cord neoplasm, and that among a group of 557 intraspinal tumors, 64 were intramedullary. Of these 64, 33 were ependymomas or ependymoblastomas and approximately 50 per cent of them were located in the filum terminale in the lowermost portion of the true spinal cord. Two illustrative case histories are given. Quoting Kernohan and others, he lists these tumors under several types—epithelial, myxopapillary, and cellular types of ependymomas.

The clinical symptoms of tumors in this part of the root or conus are characterized by pains of a sciatic type, weakness and numbness in the lower extremities, and incontinence of urine, the symptoms usually developing in that order. He believes that myelography is extremely valuable in the topographical location of the tumor. JOHN MARTIN, M.D.

Diagnostic Puncture of Intervertebral Discs in Sciatica. K. LINDBLOM. *Acta orthop. scand.*, 1948, 17: 231.

The author's rather unorthodox procedure, described in this article, consists of the fluoroscopic control of the needle point when a spinal puncture needle is passed through the interspinous space, through the dural space, on through the posterior longitudinal ligament, and into the intervertebral space where a ruptured disc is suspected to be present. Some such contrast medium as diodrast is injected. By means of this method he has been able to demonstrate the actual disruption of the disc between the vertebral bodies, showing the direction and nature of the posterior or posterolateral protrusion through the canal of rupture. He states that "so far the indication for a diagnostic disc puncture is long-standing sciatica, which was not improved by conservative treatment and which had been myelographed by abrodil without definite localization of the disc protrusion." This procedure was first done on cadavers and the excellent visualization of disc lesions on such specimens led to applying the same procedure to the living subject.

Apparently, the author does not believe that the clinical signs and myelography, although corresponding to the localization of the level of the lesion, are 100 per cent reliable evidence. The possibility of injury to the roots of the cauda equina by this procedure is only briefly mentioned by the author.

JOHN MARTIN, M.D.

The Bladder in Spinal Cord Injuries (La vessie des traumatisés médullaires). R. CARILLON and G. PELOT. *J. urol. méd.*, Par. 1948, 54: 101.

After reviewing the anatomy of the bladder, the authors discuss the physiology of micturition. They recognize a center of controlled micturition regulating the striated muscles, a center of automatic micturition in the lumbosacral segment of the cord regulating the nonstriated bladder musculature, and a center of autonomic micturition within the bladder wall. In the infant, urination is produced by a reflex mechanism involving the automatic center only, while in the adult the desire to urinate becomes conscious; the automatic center is controlled consciously by the higher center which also activates the striated bladder muscles. Wilful urination is dependent on the action of the striated sphincter muscle. The automatic system regulates the action of the detrusor muscle responsible for the expulsion of the vesical content and also of the nonstriated internal

sphincter fibers responsible for urinary retention. The innervation of the evacuation musculature is parasympathetic and is transmitted through the nervi erigentes. The sphincter tone is sympathetic and secondary and is supplied through the two branches of the hypogastric plexus fibers originating in the sacral ganglia and accompanying the nerve erigentes and periarterial sympathetic fibers. The afferent sensory pathway of the micturition reflex is also formed by the parasympathetic nervi erigentes and their posterior roots. Thus, the parasympathetic system controls sensation and emptying of the bladder, and the sympathetic system regulates bladder continence and ejaculation and also has a trophic and a secondary extraperitoneal sensory function.

The paralyzed bladder of the paraplegic shows retention during the initial period of medullary inhibition or spinal shock, and in the later phase of spastic paralysis it develops reflex contractions which become very useful in the development of automatic micturition. The authors state that in the initial flaccid stage the muscles controlled by the automatic and voluntary centers are paralyzed, while the sphincter tone controlled by the extramedullary ganglia of the sympathetic chain is not decreased but increased. The nonstriated sphincter musculature is therefore spastic, and urinary retention results. The intravesical pressure increases and eventually overcomes the internal sphincter and produces passive incontinence because of overflow.

The classical treatment of the distended bladder by repeated catheterization or continuous drainage often results in vesical, urethral, or periurethral infections, while early cystostomy does not allow complete drainage and may be responsible for infection due to urinary stagnation. Modern treatment consists of manual expression of the bladder contents. When not contraindicated by urethral obstructions or ruptures, this method enhances the development of spontaneous contractions of the bladder and restoration of micturition. The bladder does not become infected. If this procedure is not practicable, tidal drainage is the other method of choice. Various isotonic and antiseptic solutions may be used and introduced into the bladder at a rate of 60 drops per minute. The intravesical pressure can be adjusted to the tonicity of the bladder. The catheter should be changed every 6 days. When automatic micturition is established, tidal drainage should be discontinued if the residual urine is not more than 100 c.c., but continued if it is over that amount. By weekly cystometry, recovering function of the bladder can be studied. The catheter can be removed if intravesical pressure of 12 mm. of mercury produces a contraction of the bladder.

Controlled micturition may be regained only in the cases of partial cord lesions. Complete cord transsection results only in reflex urination. Tidal drainage is of no value in low cord lesions in which the bladder will remain atonic, or in cervical lesions. It is also contraindicated in urethral or prostatic infections or inflammations. When cystostomy is necessary, tidal drainage can be applied if the bladder opening is small. Occasionally, tidal drainage must be replaced by two daily irrigations of the bladder through an indwelling catheter.

As soon as the paraplegic patient enters the spastic stage, recovery of bladder function can be better evaluated. In partial cord sections nearly normal controlled micturition can be obtained provided half of the spinal cord is intact. In complete physiological or anatomical cord transsection micturition becomes automatic if the lesion is above the medullary center of Budge in the lumbosacral segment of the cord. Although the afferent sensory pathways are paralyzed, many patients have a sensation of fullness when the bladder is full. This sensation is transmitted by retroperitoneal sensory sympathetic fibers. The automatic urinary reflexes can be induced voluntarily by some patients by compressing the glans penis or pinching the internal aspect of the thighs. Thus, in accord with the site of the lesion and the intelligence of the patient, automatic micturition may be disciplined and controlled to a certain extent.

In cases of destruction of the conus medullaris or complete transsection of the cauda equina, autonomic micturition develops and results from the function of the ganglia within the bladder wall alone. The bladder and sphincter muscles become hypertrophic, the bladder content is reduced, the contractions are weak and frequent, and the residual urine is high. Complete transsection of the cauda equina produces complete bladder atonia. Tidal drainage is useless in these cases as automatic function will never develop.

Under the title of vesicourethral dystonias, the authors describe numerous and frequent obstacles which disturb the recovery of micturition. The most common are changes in the muscle fibers which result from distention, infection, and spasticity. The loss of tone, the sclerosis, and the hypertrophy of the muscle fibers are the frequent causes of difficulty in urination, pollakiuria with active incontinence, and passive incontinence. In difficult urination there is often residual urine caused by increased resistance at the bladder neck. Various remedies have been suggested, such as plastic muscle transposition, presacral neurectomies, section of the hypogastric nerves, and sacral sympathectomies, but the simplest and most efficacious procedure is the transurethral bladder neck resection. Pollakiuria with active incontinence is produced by spasticity and hypertrophy of the detrusor muscle. The bladder content is small and there is residual urine. A small amount of urine added to the residue produces micturition and results in continuous incontinence. Section of some of the parasympathetic fibers (nervi erigentes) or anterior rhizotomy of the first and second sacral roots is the most logical method of treatment. The administration of scopolamine, vitamin B_1, and a high protein diet has also been recommended. Oftentimes good results can be obtained by transurethral neck resection followed by tidal drainage. In passive incontinence the bladder is distended and empties by over-

flowing. If residual urine is present, bladder neck resection may help. However, in these cases renal function is easily disturbed and no method of treatment is satisfactory. Cystotomy must be performed if signs of kidney damage are present.

The most frequent urinary complications in paraplegics are cystitis and ascending and hematogenous pyelonephritis. They are often associated with bladder stones and are more frequent in bedridden patients. The G and M solutions may dissolve or reduce the volume of the calcium carbonate and calcium phosphate calculi. However, the larger calculi must be removed surgically. Streptomycin may help when penicillin or the sulfonamides do not succeed, but it rarely stops an infection if a bladder stone or a suprapubic fistula is present. The prognosis of urinary infections in paraplegics remains poor.

GEORGE PERRET, M.D.

PERIPHERAL NERVES

Tensile Strength of Human Nerves: An Experimental Physical and Histologic Study. C. T. LIU, C. E. BENDA, AND F. H. LEWEY. *Arch. Neur. Psychiat.*, Chic., 1948, 59: 322.

These authors have performed a very useful function in publishing the results of their obviously carefully made experiments on the tensile strength of human nerves. Their material consists of 22 human nerves—3 sciatic, 4 ulnar, 7 tibial, and 8 peroneal—which were removed from cadavers 6 to 12 hours after death, when death was in no way related to any condition of the nerves.

The authors are aware of other optimistic reports concerning the stretch capability of human nerves, but they feel that the important question is not when complete rupture occurs, but at what force damage to single nerve fibers first appears, and this they have demonstrated very well by means of a simple tensiometer. Their methods and statistics, neither of which are complicated, show that herniation of the nerve fibers through the sheath begins in the sciatic nerve at a 21 per cent stretch, and in the peroneal nerve at 16 per cent. They demonstrated to their own satisfaction that the actual tension, expressed in kilograms per square centimeter of the tested nerve, is not so good a guide to nerve damage as the actual percentage of stretch produced. One of the ulnar nerve specimens stretched 4.7 per cent under a tension of 15.3 kgm. per square centimeter, and in this specimen two of the three main fascicles composing the nerve were ruptured, while the third fascicle showed minor damage at different levels. The endoneurium is apparently less elastic than the perineurium, and often is torn transversely together with the nerve fiber bundles. The endoneurium was torn at about 20 per cent stretch. Microscopic hemorrhages were frequently noted about the endoneurial vessels. The nerve fibers in most cases were observed to be completely interrupted when the nerve was stretched beyond 10 per cent. The myelin sheaths were frequently fragmented.

Apparently the axis cylinder and myelin are the least resistant to stretch, whereas blood vessels, endoneurium, and perineurium are more resistant. The authors believe, therefore, that no human peripheral nerve should be stretched more than 6 per cent of its length, beyond which point severe internal microscopic fracture occurs in various places. Under such conditions, the degree of recovery will be greatly minimized. The significance of their findings is important in the repair of severe peripheral nerve lesions, during which the effect of stretching may not be known to many surgeons. JOHN MARTIN, M.D.

Post-Traumatic Ossification of the Peripheral Nerves. Histogenetic Study of Heterotopic Osseous Neoformations (Ossificazioni posttraumatiche dei nervi periferici. Studio sull'istogenesi delle neoformazione osse eterotopiche). LEONARDO GUI. *Chir. org. movim.*, 1948, 32: 241.

The author presents 7 cases in which calcification developed in and about the cicatricial regions of an injured nerve. Microscopic studies were made of the removed osseous neoformations. Three of these patients had suffered injury to the sciatic nerve (1 with, and 2 without associated fracture), 1 patient had an injury of the median nerve, 2 patients had suffered injury to the radial nerves without associated fracture, and 1 patient had suffered an injury to the axillary nerve with associated fracture of the clavicle. The osseous processes were of no special significance as the nerve tissues themselves did not take part in the abnormal process of calcification and the newly formed bone was easily removed without any effect on the ultimate outcome of the case.

Microscopic study of the removed tissues demonstrated that the osseous tissues in each case were entirely independent of the neighboring bone, apparently taking origin from the cicatricial changes between the ends of the injured nerve, or from the tissues of the perineurium.

From his studies of the tissues in this group of cases, the author is led to regard the theory of acellular new bone formation as postulated by Leriche and Polycard (wherein the lime salts are laid down directly within the meshes of the collagen fibers of the connective tissue without any participation on the part of the connective tissue cells themselves or cells derived from elsewhere in the body), as not adequately explaining all the findings observed in these cases. For the general process of osteogenesis, the clarifications of S. Komprecher (*Die Knochenbildung*, G. Fischer, Jena, 1937) are accepted as embodying the classical opinions on the subject. With this theory, the process of ossification is mediated by special cells (reserve cells) which normally lie dormant among the connective tissue cells until roused to form osteoblasts by the stimulus of the injury or of some other, unknown, factor. However, Komprecher's clarifications are not accepted in full; it is the author's impression that these osteoblasts arise as a transmutation of young connective cells.

JOHN W. BRENNAN, M.D.

MISCELLANEOUS

Neurogenic Bladder (Vejiga neurogenica). HÉCTOR VALLADARES *A. Arch. Soc. cir. hosp.*, Santiago, 1947, 17: 583.

The author reviews the anatomy and innervation of the urinary bladder and emphasizes the necessity of using cystometry for the correct diagnosis of functional disorders of the organ.

In the hypertonic bladder the sensitive cystometric points are displaced to the left, with a rapid increase of the manometric pressures. The so-called efferent neurogenic bladder of Simons is characterized by a small hypertonic bladder with great predominance of the parasympathetic function. It is encountered particularly in pyramidal lesions, multiple sclerosis, medullary tumors, and partial medullary involvements. The hypotonic bladder is characterized by displacement of the sensitive points to the right and by an organ of great capacity which is called afferent neurogenic bladder. Its mechanism seems to be determined especially by a considerable decrease in sensitivity which causes atony and atrophy of the detrusor muscle. This bladder has a very low pressure and empties poorly, leaving a large residue. It is found in tabes dorsalis and in lesions of the cauda equina.

Every urologist has seen patients with traumatic lesions of the brain, cerebral tumors, hemorrhages or inflammatory processes, who, while conscious, had involuntary micturitions. These patients have vesical retention during the period of shock; later they develop urinary symptoms connected with loss or decrease of function; they are incapable of starting micturition voluntarily, or of controlling it.

In incomplete high medullary lesions, the neurologic symptoms vary with the extent of the damage; there may be delay in starting urination, which then occurs with little force and a weak stream. In complete high lesions, as in traumatic cases or in myelitis, there is immediate retention, which may last for hours or days, followed by incontinence due to overflow, and finally the establishment of a certain degree of urinary automatism. If the case becomes complicated by cystitis or any other kind of acute infection, the automatic mechanism is profoundly altered and the bladder becomes small, hypertonic, and with little capacity. Therefore, the treatment of vesical function must be in the hands of the specialist from the beginning.

In traumatic lesions of the lumbar and sacral segments the same stages are observed: retention, incontinence from overflow, and automatism. But the latter is hard to attain, especially in lesions of the sacral regions in which so-called paralytic incontinence is the rule. It is obvious that if the reflex center itself is involved, the degree of automatism obtained will depend on the degree of damage sustained. Therefore, in these cases aseptic measures are imperative to preserve a good bladder function from the beginning.

In lesions of the cauda equina, and especially those in which the nerves corresponding to sacral nerves 2, 3 and 4 are destroyed, extremely grave changes are produced because the principal routes of the vesical automatism are interrupted. Theoretically, such a lesion should never improve, but here occurs the best defense against traumatism because the displacement of the roots prevents their total destruction.

The lesions produced in tabes dorsalis consist basically of an interruption of the sensorial reflex arc in such a form that the muscular tonus has disappeared with the production of an exaggerated stretching of the bladder wall; this results in an organ of large capacity with very low tonus and contraction that always leaves a large residue; the urinary stream is thin with final dribbling which may continue for some time.

In bilateral chordotomy incontinence is frequent, but not as frequent as has been reported; in unilateral chordotomy, when a urinary complication occurs, it is a retention of short duration, and the bladder function returns in a few days.

In hernias of the intervertebral disc in which it is necessary to displace the nerve roots beyond the midline, periods of postoperative retention are observed which may persist for some days, but recovery of function is complete and practically normal.

RICHARD KEMEL, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Advanced Mammary Cancer. MAX CUTLER and MELVIN SCHLEMENSON. *J. Am. M. Ass.*, 1948, 138: 187.

Twenty consecutive patients with advanced mammary cancer were treated with testosterone propionate intramuscularly. Initial doses of 300 mgm., were followed by 150 mgm. twice weekly until between 2,250 and 4,650 mgm. were given to the 5 patients whose cases are reported in detail.

Four of the 20 patients showed definite improvement in their condition. In 1 patient there was skeletal metastasis, in another skeletal and soft tissue metastasis, and in 2 patients, soft tissue metastasis. Recurrence developed in all of them within a year. The longest period of improvement was 11 months. Four patients, all with the disease confined to the soft tissues, showed transitory improvement in their condition, with temporary tumor regression and improvement in their well being. Twelve patients showed no significant improvement; 6 of these had only soft tissue involvement and 6 only skeletal involvement initially, although 3 developed skeletal metastases while under treatment. There was no evidence that the disease was accelerated by the treatment in any of these 12 cases.

On the experience with these 20 cases, it seems advisable to withhold testosterone therapy until other well established procedures have reached the limits of their usefulness. Both surgical castration and roentgen sterilization frequently produce results which are comparable to those seen following testosterone therapy. Because testosterone increases the retention of sodium, potassium, and protein nitrogen, and hence water, testosterone should be used cautiously in patients with cardiac disease. It is suggested that treatment, when favorable, be continued until the palliative effect is no longer evident, because, in the present cases when treatment was stopped a second course of testosterone did not renew the initial favorable effect.

Masculinization and cessation of the menses occur when more than about 200 mgm. of testosterone are administered per month. There is no evidence that cure can be achieved by testosterone therapy, and palliative results can be anticipated in only a relatively small number of patients.

FRANK B. QUEEN, M.D.

TRACHEA, LUNGS, AND PLEURA

Exploratory Thoracotomy in the Management of Intrathoracic Disease. JOHN B. GROW, MARTIN L. BRADFORD, AND HUGH W. MAHON. *J. Thorac. Surg.*, 1948, 17: 480.

The present day use of mass x-ray surveys of the chest and the taking of chest roentgenograms routinely on hospital admissions in many institutions has disclosed an increased number of asymptomatic thoracic lesions. Consecutive hospital admission roentgenograms are estimated to present evidence of thoracic disease in from 8 to 10 per cent of cases.

Such cases tax the clinician's diagnostic ability severely because all too frequently a conclusive diagnosis cannot be made, even after the most complete and exhaustive study. As a final diagnostic approach in such cases, exploration is recommended.

The authors report on an experience with 200 consecutive exploratory thoracotomies performed at Fitzsimmons General Hospital, Denver, Colorado, between September, 1942 and April, 1947.

The lesions were distributed in the following locations: the mediastinum, 73; the lung, 113; outside of the lung (exclusive of mediastinal and vascular), 8; and in the heart and great vessels, 6.

In these cases there was an overall incidence of malignant lesions of 21.5 per cent. The roentgen appearance of the pulmonary conditions was that of circumscribed lesions in 86 cases and of atelectasis in 35 cases. The circumscribed lesion was proved to be malignant in 21 cases and tuberculous in 37. The atelectasis resulted from bronchogenic carcinoma 11 times and from tuberculosis 3 times. Sixteen per cent of the mediastinal lesions were proved to be malignant.

The various possible diagnostic procedures are given brief appraisal, it being pointed out that positive bronchoscopic biopsy can be expected in only about 50 per cent of the resectable neoplasms. Likewise, the practice of relying on a test dose of x-radiation as a means of identifying members of the lymphoblastoma group of tumors is condemned because:

1. All malignant lymphomas do not respond to x-ray therapy.
2. Many benign lymphadenopathies and resectable malignant lesions of the thymus do respond to irradiation and this would lead to an erroneous diagnosis.
3. There are indications that the prognosis of localized mediastinal lymphoma is improved by combined resection and irradiation therapy.
4. The prompt establishment of a histologic diagnosis expedites the initiation of treatment.

Since the incidence of malignancy is significantly high in the obscure intrathoracic lesions described and the treatment of choice in the vast majority of nonmalignant conditions is surgical removal anyway, exploratory thoracotomy is recommended after the more conservative diagnostic methods which are employed expeditiously have failed to clarify the condition.

The risk of exploratory thoracotomy per se is nil, the mortality being dependent upon the gravity of the therapeutic portion of the operation. There

were 8 deaths in the series, 5 following pneumonectomy for cancer and 1 death following pneumonectomy for blastomycotic suppurative disease; 1 death followed a lobectomy, and the last death occurred in a patient with an inoperable neurogenic sarcoma. The morbidity was as follows: 12 pleural effusions, 5 postoperative atelectases, 3 minor wound infections, and 4 empyemas.

The text is supplemented by 19 illustrative roentgenograms, 3 statistical tables, and 27 bibliographical references. HIRAM T. LANGSTON, M.D.

Transtracheal Anesthesia for Bronchoscopy. DWIGHT E. HARKEN and ARNOLD M. SALZBERG. *N. England J. M.*, 1948, 239: 383.

Since bronchoscopy contributes greatly to the diagnosis and treatment of intrathoracic disease, the use of a proper anesthetic during the operation serves the interest of both the patient and the bronchoscopist.

A method of administering a dilute pontocaine solution for bronchoscopic anesthesia via the cricothyroid membrane directly into the trachea is described. The technical details of the procedure are outlined.

The safety of the method is supported by experience in more than 1,000 patients. Only 3 of the patients developed a superficial cellulitis of the soft tissues about the site of the injection. This method of anesthesia should not be used in the presence of extensive tuberculous disease of the larynx and upper trachea, since there may be danger of the development of a tuberculous sinus in such cases. No sinuses, however, resulted among the 1,000 cases described, though the anesthesia has been extensively used in open cases of tuberculosis.

The application of this form of anesthesia in bronchoscopy for the removal of foreign bodies is contingent upon the position of the foreign body itself.

SAMUEL KAHN, M.D.

Chronic Nonspecific Suppurative Pneumonitis. RICHARD D. KERSHNER AND W. E. ADAMS. *J. Thorac. Surg.*, 1948, 17: 495.

This article describes the clinical picture of a pulmonary condition which is sufficiently well defined to be considered a disease entity. The report is based on an experience with 10 cases of suppurative pneumonitis.

The disease is characterized by an insidious onset, chronic course, productive cough and hemoptysis, and a diffuse chronic inflammation of the lung without abscess formation.

The clinical characteristics include chest pain with low-grade fever, as well as cough and hemoptysis. The symptoms have lasted from 6 months to as long as 22 years. Females predominate 2 to 1 among the patients so afflicted, and the 30 to 50 age group is chiefly affected.

The condition must be differentiated from bronchogenic carcinoma, chronic lung abscess, tuberculosis, and bronchiectasis. The principal features of the differential diagnosis are the gradual onset of symptoms without obvious cause, and diffuse infiltration of the lung without signs of bronchial dilatation or cavity formation on x-ray examination. Differentiation from bronchogenic carcinoma in the cases of short duration usually must await pathologic study. No definite etiologic agent has been found. The bacteriologic flora is nonspecific. Tubercle bacilli are, of course, absent.

The basal portions of the lung were involved more frequently than the upper; the right side more often than the left, although 1 case was bilateral. The pathologic picture includes interstitial fibrosis, thickening and fibrosis of the alveolar walls, lymphoid hyperplasia, narrowing of the bronchial lumen by redundant mucosa, chronic atelectasis, and infiltration by macrophages.

The treatment recommended is resection. Under medical management many of the patients showed transient improvement, but the symptoms recurred and progression of the lesion could be demonstrated with x-rays. Most of the patients became significantly incapacitated.

Surgery with drainage or resection was employed in 9 patients. In 1 case only was a biopsy taken (bilateral involvement). The 9 patients all returned to full activity in 1 to 2 years, except 1 who died of pneumonia 5 days after operation. Resection is preferred because the period of morbidity is shorter than with drainage (with resection the hospital stay averaged 22 days as against 59 days with drainage, and clearing of the lung fields occurred in from 6 to 7 months as against 12 months), and the relief of symptoms is likely to be more complete. Also, when bronchogenic carcinoma cannot be ruled out, an added reason for resection is present.

The text is supplemented by illustrative roentgenograms and photographs. Statistical data is presented in tabular form. Two detailed case histories are appended. HIRAM T. LANGSTON, M.D.

Pulmonary Decortication in the Treatment of Early Pyogenic Empyema. EDWARD F. PARKER AND THOMAS H. BURFORD. *Surgery*, 1948, 241: 371.

The authors have revived the idea of early post-empyema mobilization of the lung. They state that in order for decortication to be successful, three conditions must prevail and, for the most part, they are present before the empyema is "chronic": (1) there must be a line of cleavage between the inflammatory membrane and the capsule; (2) the underlying viscera must be normal rather than thickened and fibrotic (this tends to be the case early in the course of the empyema), and (3) the lung must be intact and able to expand completely, not atelectatic.

Indications for primary decortication without preliminary drainage are (1) the presence of a massive cavity causing 50 per cent or more collapse of the lung, and more particularly if collapse involves the apex of the lung; and (2) fever of no more than from 102.0 to 103.0 degrees as this does not

contraindicate primary operation if the patient does not appear too toxic. The time for primary decortication from a pathologic standpoint is within 6 weeks of the onset of empyema and preferably as soon as the diagnosis is made and the patient is prepared.

Secondary decortication is indicated for the same reasons as already stated and is done in "early empyema," that is, 4 weeks after adequate rib resection drainage; if the lung fails to expand further and the empyema cavity does not diminish, a secondary decortication is done. Needless to say, if there is present a lung abscess, or a bronchopleural fistula, it must be eradicated at or before the time of decortication.

The two important factors in successful postoperative management are (1) complete pulmonary expansion maintained by drainage, and (2) parental and local antibiotic therapy for from 7 to 14 days postoperatively.

Two cases of primary decortication done 33 and 41 days after onset of empyema, respectively, are reported. Three cases of secondary decortication done 31, 28, and 32 days, respectively, after rib resection are presented.

JANE C. MACMILLAN, M.D.

Studies in Lung Abscess: The Etiology of Lung Abscess. R. C. BROCK. *Guy's Hosp. Rep.*, Lond., 1948, 96: 141.

When sufficient care is taken in elucidating the history of lung abscess, a primary or existing cause can be found in about 75 per cent of the cases. Only after all avenues of approach are exhausted should the diagnosis of primary lung abscess be accepted.

Many analyses of the etiology of lung abscess have been made in the literature. Among the causes listed are operations on the upper respiratory tract, such as tonsillectomy, tooth extraction, and sinus operations; other operations under general anesthesia; pneumonia; influenza; malignant disease; bronchiectasis; acute respiratory infections; dental sepsis; and such causes as epilepsy, alcoholic stupor, and submersion. The percentages of these causes have varied greatly from one series to another. It is also of interest that in some large series no mention is made of malignant disease, and it is quite striking that dental sepsis as a cause is omitted in most series.

In a series of 363 cases of lung abscess composed of one group of 276 consecutive cases seen from 1942 through 1946, and a second group of 87 operative cases, the basic etiology is analyzed. Forty-seven cases (13%) were due to bronchial carcinoma. Other nonmalignant causes which were identified involved 223 cases (61.5%), making a total of 270 (74.5%) in which the causes were identified. Thus only in 93 cases (25%) was the cause obscure and the diagnosis of "primary" lung abscess made. Of the 316 nonmalignant cases, 80 (25%) were found to be postoperative, 41 occurring after abdominal operations and 39 after nonabdominal operations. Of the latter, 25 occurred after tooth extraction and 7 after tonsillectomy. Sixty cases (19%) were classed as being due to dental sepsis. Specific infections with the Staphylococcus, Streptococcus, Friedlander's bacillus, and the Actinomyces accounted for 26 cases (8%). Fifty-six (18%) resulted from various identified causes, making a total of 222 cases (70%) in which the causes were identified. Ninety-four cases (30%) were classed as obscure "primary," or "cryptic" lung abscesses.

The various factors responsible for the high incidence of lung abscess following tooth extraction appear to be multiple extractions under deep anesthesia, extraction of septic teeth with tartar masses, upright position in the dental chair, and badly given nitrous oxide anesthesia with cyanosis and obstructed respiration. The position of the patient during recovery from anesthesia for operation on the mouth, nose, and pharynx is an important consideration; the prone position provides the greatest freedom from the risk of bronchial embolism, as fewer bronchi are vulnerable in this position. Raising the patient's feet lessens the risk even more.

Gross dental sepsis is a very important factor in the etiology of lung abscess, and elective surgery should not be embarked upon in the presence of pus pockets, gum infections, and tartar masses. Anesthetists and surgeons alike share the responsibility for proper preoperative dental care in all but emergency cases.

In patients below the age of 15, the cause of lung abscess is almost always identified, the most common cause being staphylococcal pneumonitis. Contrary to the usual belief, abscess secondary to an inhaled foreign body is quite rare, only 3 cases being encountered in the entire series.

In young adults from 15 to 25 years of age, the cause is usually apparent. An operation is the most likely preceding event, tooth extraction and tonsillectomy being of equal importance.

In older patients the proportion of cases in which the cause cannot be identified, or is found only after searching inquiry, increases. Preceding operation, including tooth extraction, and gross dental sepsis are leading causes. Carcinoma must be considered in this group. In obscure cases, such items as the patient's occupation, alcoholic intoxication, epilepsy, immersion, and overdose of sedatives must be thought of and asked about specifically. Tuberculosis always demands exclusion, especially in obscure middle-lobe abscesses. With increased knowledge, experience, and diligence the percentage of "obscure" or primary lung abscesses should continue to decrease.

JESSE E. THOMPSON, M.D.

Nonmalignant Intrathoracic Lesions Simulating Bronchogenic Carcinoma. LYMAN A. BREWER, III, WILFRED M. G. JONES, and FRANK S. DOLLEY. *J. Thorac. Surg.*, 1948, 17: 439.

In the authors' experiences with 300 cases of lung carcinoma, only about one-half could be visualized by bronchoscopy. The authors have classed those lesions of the lung beyond the limits of bronchoscopic

diagnosis as peripheral, and in this presentation they review 30 nonmalignant intrathoracic conditions which simulated bronchogenic carcinoma and which were subjected to surgery. The 30 were as follows:

Inflammatory		20
Lung abscess	6	
Tuberculosis	5	
Pneumonitis	3	
Bronchiectasis	3	
Granuloma	1	
Echinococcus	1	
Silicosis	1	
Benign tumors		6
Adenoma	3	
Lipoma	2	
Fibroma	1	
Developmental		4
Cysts	3	
Thyroid	1	

Of these 30 benign instances, 23 could not be expected to end in recovery with conservative treatment, 6 cases were equivocal, and 1 case was hopeless regardless of the type of treatment employed. Twenty-seven patients were cured by surgery, 2 were not benefited, and 1 patient died after operation.

The authors emphasize the difficulty in establishing the preoperative diagnosis of bronchogenic carcinoma in locations where visualization and biopsy by bronchoscopy is not possible, and conclude with a recommendation for exploratory thoracotomy when carcinoma cannot definitely be eliminated. If carcinoma is found, pneumonectomy is the procedure of choice. If a benign lesion is present, this series indicates that in most instances simple local resection is necessary.

The authors liken the management of suspected bronchogenic carcinoma to that of suspected mammary carcinoma, in which exploration and biopsy are done, followed by radical excision if cancer is found.

C. Frederick Kittle, M.D.

The Diagnosis and Operability of Bronchogenic Carcinoma. John H. Gibbon, Jr., Louis H. Clerf, Peter A. Herbut, and John J. DeTuerk. *J. Thorac. Surg.*, 1948, 17: 419.

Carcinoma of the lung ranked fourth as the cause of death among cancer mortalities in 1944. Because of this, the need for its earlier diagnosis, more radical operation, and the reduction of postoperative mortality are stressed by the authors in consideration of 56 consecutive cases of bronchogenic carcinoma seen at Jefferson Hospital, Philadelphia.

Education of the public and the general practitioner in the recognition of premonitory symptoms will help most. The first symptoms in this series in order of decreasing frequency were: cough, production of sputum, chest pain, hemoptysis, weight loss, dyspnea, wheezing respiration, and bouts of pneumonitis. A diagnosis of virus pneumonia or unresolved pneumonia in males between the ages of 40 and 70 years should not be made without excluding the possibility of a carcinoma, which occludes the bronchus with infection distal to the point of obstruction. Roentgenoscopic examinations in patients with bronchogenic carcinoma almost always reveal some abnormality. Bronchoscopy will often confirm the diagnosis suggested by the x-rays, provide a positive biopsy, or in rare instances disclose a tumor not apparent on roentgenological examination. Needle biopsy may be done in those instances in which the tumor is peripherally located, but this method is not particularly recommended. An important adjuvant to the diagnosis of bronchogenic carcinoma is the cytologic study of bronchoscopic aspirations. If no secretion is obtainable from the bronchus, from 2 to 5 c.c. of salt solution may be injected into the bronchus and then removed. Of 118 cases studied by this method by the authors, 90 per cent showed neoplastic cells, while in the same group only 45 per cent provided a positive bronchoscopic biopsy. In some patients a definitive diagnosis cannot be made without exploratory thoracotomy.

All patients should be subjected to thoracotomy unless there is unequivocal evidence of extension of the disease beyond the hemithorax in which the tumor lies, or unless a pleural effusion exists which is bloody or contains malignant cells. In the group with nerve palsies indicating involvement of the phrenic nerve, recurrent laryngeal nerve, or sympathetic trunk, the issue is debatable, some tumors being resectable by block dissection and others being inoperable.

The decision as to whether or not a pneumonectomy should be done is based on the same principles as are applied to cancer surgery for tumors located elsewhere in the body. If all visible and palpable tumor can be removed without leaving any evidence of malignant tissue, the authors believe a radical pneumonectomy should be done. The procedure suggested by Allison is believed most effective; this consists of intrapericardial ligation of the pulmonary vessels at their junction with the left auricle.

In 20 pneumonectomies and one partial removal of the right lower lobe by the authors there were 2 deaths, one due to tension pneumothorax, the other from an empyema secondary to bronchopleural fistula. This represents a considerable decline in postoperative mortality from previous years.

C. Frederick Kittle, M.D.

The Treatment of Inoperable Bronchogenic Carcinoma with Methyl-Bis. Edward F. Skinner, Duane Carr, and William E. Denman. *J. Thorac. Surg.*, 1948, 17: 428.

The authors report their experiences in the treatment of 25 patients with inoperable bronchogenic carcinoma by means of methyl-bis (beta-chloro-ethyl amine hydrochloride), a derivative of the nitrogen mustard compounds best known for its palliative action in lymphomas. Methyl-bis has been shown to

produce its effects by direct action on the chromosomes.

Their procedure consisted of the intravenous administration of 0.1 mgm. of methyl-bis per kilogram once daily for 4 days, usually with 1,000 c.c. of isotonic saline solution. This was repeated in 2 or 3 months, and more often when desired, the patient usually being hospitalized for 5 days during the administration of methyl-bis. The history, physical status, blood count, and fluoroscopic or x-ray findings were ascertained every 2 weeks.

About 50 per cent of the patients develop varying degrees of nausea, vomiting, and anorexia after administration of this chemical, but these conditions are usually of shorter duration than when they are caused by x-ray treatment. This incidence can be reduced by giving 100 mgm. of pyridoxine hydrochloride early in the morning of the treatment day. From 10 to 20 per cent of the patients may require blood transfusions to combat the erythrotoxic effect of methyl-bis.

Methyl-bis is more advantageous than x-ray therapy because it is cheaper, is more easily administered, may be used in cases with widespread metastases in which irradiation is of little value, and because the toxic symptoms are less severe.

Twenty-five patients with far advanced bronchogenic carcinoma were treated with methyl-bis. Of these, 3 had adenocarcinoma, 5 had squamous-cell carcinoma, and 17 had undifferentiated cell carcinoma. The clinical course of 17 is reported in detail and, of these, 10 received irradiation in combination with the methyl-bis. The majority of the patients showed improvement in their condition as manifested by weight gain, decrease in cough, dyspnea, and bouts of pulmonary infection, and by the alleviation of pain.

This chemical is suggested as a palliative agent in the treatment of inoperable bronchogenic carcinoma. C. FREDERICK KITTLE, M.D.

ESOPHAGUS AND MEDIASTINUM

The Importance, and a Discussion, of Connectivomas of the Upper Respiratory Tract (Relievi e considerazioni sopra i connettivomi delle alte vie aeree). CARLO SIRTORI and CESARE BECCHERLE. *Tumori*, Milano, 1948, 34: 12.

During a period of 20 years the authors treated 175 patients with connective tissue tumors of the upper respiratory tract. There were 77 reticulosarcomas, 37 angiomas and fibroangiomas, 31 sarcomas, 7 lymphosarcomas, 6 epulis, 5 osteomas, 4 endotheliomas, 3 fibromas, 2 chondromas, 2 plasmocytomas, and 1 lymphoepithelioma.

Reticular cells, even if they become malignant, preserve their evolutionary omnipotence. According to the predominating tendency, sarcomatous, histiocytic, and endothelial varieties of reticulosarcomas may be distinguished. Occasionally an evolution of the same group of tumors toward fibrosarcomas or lymphosarcomas may be observed. Aplastic forms or reticulosarcomas in the strict sense of the word must be distinguished from blastic forms, such as histiocytic, fibrocystic, endothelial, or lymphocytic types. A precise diagnosis is of importance for the prognosis: pure reticulosarcomas and the lymphosarcomatous forms are more malignant but also more radiosensitive than other types.

Polyps may assume the form of a circumscribed elephantiasis with all the evolutionary possibilities of such formations.

Typical and atypical forms of blastic sarcomas may be distinguished. Myxoblastic, fibroblastic, lipoblastic, angioblastic, chondroblastic, and osteoblastic tumors belong to this group. The anaplastic sarcomas may also be divided into typical and atypical types. Such classification is of clinical importance. Typical blastic sarcomas are relatively benign. They easily recur and infiltrate adjoining tissues, but they rarely produce distant metastases. Atypical blastic tumors show a greater aggressive infiltrating activity and form distant metastases. Atypical anaplastic sarcomas possess the highest degree of malignancy.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Radical Extirpation and Primary Closure of Deep Thoracic Fistulas. JENS L. HANSEN. *Acta chir. scand.*, 1948, 96: 485.

A method for the operative treatment of deep thoracic fistulas with chronic empyema or abscess of the lung is described. A regular large thoracotomy is made and all pathological tissue is removed. The extirpation extends from the skin fistula to the inner side of the thoracic wall and on or in the lung where the bronchial fistulas are sutured. The wound cavity is powdered with penicillin and sulfathiazole. Primary suture is done in layers with silk. The wound exudate is aspirated daily and systemic treatment with penicillin and sulfathiazole is administered.

Five case reports are presented. In 1 patient a drain had to be used on account of persistent infection. In this case the organisms were resistant to penicillin and sulfathiazole. In all other cases primary healing was achieved. In less than a month all of the patients were cured of an illness lasting from 6 to 12 months.

The operation causes no deformity of the skeleton, gives the best possible lung function, and requires only simple postoperative treatment.

JOHN J. MALONEY, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

The Hernia Problem, with Reference to a Modification of the McVay Technique. JACK M. FARRIS, JEROME ETTINGER, and JOSEPH A. WEINBERG. *Surgery*, 1948, 24: 293.

The authors contend that indirect hernias, particularly in young people, are best dealt with by simple excision and transfixion of the hernial sac with minimal disturbance to either the cord or the floor of the inguinal canal. Suturing the conjoined tendon to Pouparts' ligament is fallacious because (1) there is no weakness in the floor of the canal, (2) nowhere in human economy is muscle used as a buffer state, and (3) muscle fixation is bound to result in atrophy from disuse. About 75 per cent of recurrences do not occur through the posterior wall but through the internal ring; therefore, operations designed to reinforce the floor of the canal are ill conceived.

Simple ligation of the sac is inadequate if the internal ring is dilated or if there is weakness of the posterior wall of the inguinal canal. When the latter exists the problem is the same as in direct hernia.

The authors summarize the anatomical studies of McVay and Anson which note that the transversalis fascia, transversus abdominis, and internal oblique muscles do not insert on the inguinal ligament, and that suturing of these structures to the inguinal ligament violates the surgical principles of restoring musculofascial anatomy to normal.

Cooper's ligament herniorrhaphy is the operation of choice in dealing with large indirect hernias (with associated defect of the inguinal floor), direct hernias, recurrent hernias, and femoral hernias. The authors describe the surgical technique employed and supplement the article with four excellent illustrations. ELY ELLIOTT LAZARUS, M.D.

The Relation of Incisional and Inguinal Hernias, as Well as of Mechanical Intestinal Disturbances, to Previous Operations for Appendicitis with Peritonitis. AUNE PITKÄNEN. *Acta chir. scand.*, 1948, 96: Supp. 138.

The author presents a survey of clinical material on the subject of incisional and inguinal hernias studied from many different points of view, as well as his personal observations on many aspects of the subject. Considerable space is given to an historical account of the development of therapy in these cases. The clinical material was obtained from three different hospitals.

The author was unable to establish any relationship between age and the occurrence of inguinal hernia; however, he noted that incisional hernias occurred more frequently in women than in men. He also noted that incisional hernias occurred somewhat more frequently in intellectual workers than in laborers. He noted an increased predisposition to incisional hernia in cases in which the time between the onset of the disease and operation was prolonged. The incidence of incisional hernias increased as the stage of the disease advanced, which finding is compared with appendicitis with perforation and appendicitis without complications. A prolonged period of drainage also predisposes to incisional hernia.

The author observed that inguinal hernia occurred more frequently following use of the McBurney incision than with Lennander's and Krogius's incisions. Total intestinal occlusion occurred more frequently after operations for conditions in the "abscess stage" than in conditions operated upon earlier.

ROBERT E. FLORER, M.D.

GASTROINTESTINAL TRACT

Diagnostic and Therapeutic Problems in Diverticulitis. C. P. LEROYER, JR., and BENJAMIN V. WHITE. *N. England J. M.*, 1948, 239: 245.

During the 20 year period from 1927 to 1946, 200 cases of diverticulitis were seen at the Hartford Hospital, Hartford, Connecticut, which serve as the basis for this study. Of these, 50 were complicated by perforation or obstruction. This incidence, as noted by the authors, is much higher than in the community at large as many patients are selected for hospital admission because of symptoms attributable to the complications rather than to the disease itself.

Diverticulosis and diverticulitis are relatively common in persons past the age of 45 years. Diverticulitis occurs at some time in from 17 to 27 per cent of all cases of diverticulosis. The authors of this article emphasize the difficulties of diagnosis that arise from confusion with diseases affecting neighboring organs rather than the incidence, statistics, and pathological features of the disease.

In the 200 cases of diverticulitis reported, the diagnosis was made by means of the clinical picture in addition to the x-ray findings in 161 cases, at operation in 32 cases, by the clinical picture alone in 5 cases, and at autopsy in 2 cases. Of the 32 patients in whom the diagnosis was made at operation, 15 were suspected primarily of having acute appendicitis, and 17 were operated upon with such preoperative diagnoses as pelvic inflammatory disease, acute cholecystitis, intestinal obstruction, and ruptured ovarian cyst. However, in none of these 32 cases was a barium enema given.

The leading signs and symptoms were similar to those described by others and consisted of abdominal pain, fever, constipation, leucocytosis, diarrhea, back pain, and melena.

The authors noted pain in the lower back in 20.5 per cent of their cases. Heretofore little emphasis had been placed on this symptom, but in their experience this symptom may be a striking part of the

clinical picture. Another symptom, often the presenting complaint, was the passage of blood by rectum. This may appear as free blood or as flecks on the fecal material. Melena occurred in 16.5 per cent of the cases reported in this series. This sign is somewhat disconcerting, because it detracts from the significance of blood in the rectosigmoid as an indication of polyps or other neoplastic lesions, and complicates the differential diagnosis.

Of the 200 Hartford Hospital patients, 161 had barium enemas that showed diverticulosis in the colon, and 133 of these demonstrated definite spasm of the sigmoid with narrowing of the lumen. A mass was demonstrated by barium enema in 33 of the 161, and the mass was invariably in the sigmoid region. However, the appearance of a mass on x-ray examination is not necessarily diagnostic, since it may indicate an unrelated carcinoma or other disease.

Complications were encountered in 50 cases, or 25 per cent of the series. There were 43 cases of perforation and 7 cases of mechanical obstruction due to local inflammation. Of the cases of perforation, 32 led to local abscesses, 1 to generalized peritonitis, 4 to mechanical ileus, and 6 to fistulas.

Sixty-three operations were carried out, 19 for diagnostic purposes. In all of the patients there was acute diverticulitis of the sigmoid. Six patients were operated on for other conditions and acute diverticulitis was found incidentally. There were 38 therapeutic surgical procedures, which included irrigation and drainage of abscesses, colostomy, cecostomy, Mikulicz procedures, and resections.

EDWARD F. LEWISON, M.D.

Diverticula of the Stomach; Report of 26 New Cases. S. P. BRALOW and M. A. SPELLBERG. *Gastroenterology*, 1948, 11: 59.

The authors discuss the available literature and report 26 new cases of apparently true, and 4 cases of false or acquired gastric diverticula. This number represents about 0.015 per cent of all admissions, but 2.6 per cent of 350 gastroscopies showed gastric diverticula. Apparently the incidence of this lesion is not as rare as is generally believed.

Radiologically their series showed 17 true diverticula located on the posterior wall of the lesser curvature of the cardia, while 7 were found at the same location in the pars media. Two were observed on the greater curvature of the cardia. Of the false or acquired diverticula, 3 were found in the pyloric region on the lesser curvature, and 1 was observed at the posterior wall of the greater curvature in the pars media. Two of the 3 pyloric diverticula were on the posterior wall, and the third was on the anterior wall.

All 26 of the authors' patients had symptoms referable to the gastrointestinal tract at one time or another, but 15 had associated lesions that probably contributed to the symptomatology. In general, however, the symptoms are neither diagnostic nor characteristic, but may be incapacitating, with pain, vomiting, and hemorrhage. It is probable that the production of symptoms depends upon complications such as inflammation or ulceration of the diverticulum, and that both of these may depend on retention of food particles in the sac. Occasionally a gastric diverticulum may cause typical ulcer pain which is relieved by food and alkalies.

The radiologic diagnosis depends on the retention of opaque media, and is most commonly seen after the stomach empties.

In the experience of Bralow and Spellberg, gastroscopy for visualization of diverticula affords no more risk than gastroscopy for other lesions. The gastroscopic appearance is quite characteristic and cannot be easily confused with other lesions. The ostium of the diverticulum may be perfectly round or oval and may change in size and shape during observation. In some cases one may observe a ridge or slight elevation suggestive of a ring of muscle fibers surrounding the opening; in other instances rugal folds, resembling those seen in a gastric ulcer, are observed radiating toward the ostium. The depth of the opening is dark, while in an ulcer crater the base is covered by an exudate.

As a rule, the diagnosis of gastric diverticula is not difficult provided the clinician is mindful of this lesion and institutes careful roentgenographic and gastroscopic studies. It should also be kept in mind that since gastric diverticula frequently may be asymptomatic, their mere presence should not be accepted as the sole factor accounting for the patient's symptoms. Before attempting therapy, it is imperative to make certain that the diverticulum is inflamed, retentive, and the sole cause of the existing symptoms. If the symptoms are mild, a medical regimen of a bland, smooth diet, and alkalies and bismuth taken 1 to 2 hours after meals will afford relief. Gastric lavage and postural drainage may be helpful when retention in the diverticulum is present; prolonged postural drainage is particularly advised for diverticula located at the cardia. However, if the symptoms persist, or associated lesions such as benign or malignant ulcerations are suspected or found, surgery is indicated. Total excision of the diverticulum with inversion of the stump should be attempted. Simple invagination of the pouch with a closure of the mural muscular ring by a purse string type of suture is not adequate.

During surgical exploration it is frequently difficult to find the diverticula. In 3 of the authors' 5 cases the diverticula could not be located at operation. To obtain the best exposure the gastrolienal ligament and the gastrocolic omentum may have to be divided. This maneuver will permit the mobilization of the fundal end downward and toward the midline. Occasionally, the gastrohepatic omentum also must be divided. ROBERT TURELL, M.D.

Neurohumoral Aspects of Peptic Ulcer Formation. J. WENER and H. E. HOFF. *Canad. M. Ass. J.*, 1948, 59: 115.

In spite of the early and many brilliant observations of clinical pathologists pointing to the asso-

ciation of brain damage and changes in the stomach, the concept of the neurogenic basis for ulcer formation was given little consideration because of the dominating views of Virchow who held that peptic ulcer was essentially a local disease. Interest in this aspect of ulcer formation was revived by Cushing's Balfour Lecture. The authors, in an exhaustive and thorough review of the clinical and experimental evidence of the neurohumoral aspects of ulcer, discuss the etiologic factors of chronic peptic ulcer in man.

In surveying the clinicopathological literature for evidence of the association of gastric and duodenal lesions with intracranial disorders, the authors found that nearly all of the lesions were of the acute type. There was no special preference for localization and the gastrointestinal lesions were usually multiple. Almost all ulcers were a hemorrhagic type of erosion with edema of the mucous membrane. Most of the cases of gastrointestinal bleeding or perforation were noted very shortly after brain injury. Intracranial damage in the neighborhood of the third and fourth ventricle was most frequent in the cases of trauma.

Reviewing the experimental evidence, the authors believe that it may not be justifiable to interpret the types of responses obtained from hypothalamic lesions as purely sympathetic or parasympathetic, for evidently both systems were frequently activated simultaneously. It seems more correct to consider that lesions placed in the hypothalamus upset the autonomic regulating mechanism, thereby setting up a state of autonomic imbalance resulting in vasomotor changes in the gut. These may be severe enough to cause mucosal hemorrhage or acute ulceration. Although there is clear-cut evidence that hypothalamic lesions and lesions of the pons, medulla, and upper spinal cord may initiate acute gastrointestinal lesions, there is no evidence that these lesions have ever gone on to form chronic ulcers of the type seen in man.

Studies on vagotomies and splanchnicectomies confirm the work done on damaging the hypothalamus in experimental animals. By creating an imbalance in the autonomic innervation of the gut, there resulted alterations in gastrointestinal motility, secretion, and vascular changes in the mucosa. Acute ulceration may occur; but rarely, if ever, do these changes go on to chronic ulcer.

Reviewing the relation of gastric secretion to peptic ulcer, the authors conclude that the main body of evidence indicates that the nocturnal gastric secretion in patients with ulcer is generally greater in volume and higher in acidity than that found in normal subjects. However, a more careful study under rigidly controlled conditions would be necessary before any definite conclusions could be drawn. The range of acidity of the gastric contents of patients with ulcer closely parallels that found in normal subjects, varying from complete anacidity to hyperacidity. The experimental evidence reviewed by the authors fails to offer convincing proof that hypersecretion of acid or excessive nocturnal gastric secretion are prime factors in ulcer pathogenesis. Acid pepsin secretions only act upon mucosa which has already been injured.

The experimental and clinical evidence reviewed indicates that the absence or deficiency of intestinal secretions and mucus are not responsible for the production of ulcer per se, yet the deficit of these neutralizing factors may be of some importance in ulcer formation. The work of Winkelstein, Fogelson, Dragstedt, and Wangensteen is carefully considered.

Although the authors point out that vagotomy has yielded immediate relief of ulcer symptoms and has allowed for prompt ulcer healing, the postoperative period of observation has been short. Wolf and Andrus have shown that gastric hyperemia and engorgement of the stomach mucosa due to vascular congestion induced by feelings of anger and resentment in a patient with a gastrostomy, fail to occur after vagotomy. Thus, any permanent benefits from vagotomy may be the result of interruption of the cephalic impulses.

The work of many investigators is critically reviewed regarding the administration of pilocarpine, adrenalin, acetylcholine, mecholyl, histamine, pitressin, and caffeine. The gastrointestinal lesions thus produced were all of the acute type.

Repeated vascular insults to the gastrointestinal mucosa produced by various experimental methods, although severe enough, produced only transitory ulcers.

The authors, in a review of more than 350 references, conclude that there is a physiological basis for the neurogenic concept of ulcer formation. Marked circulatory disturbances initiate acute gastrointestinal lesions. The psychosomatic concept of ulcer formation is considered an important factor. Peptic ulcers may well be a pathological sequel to autonomic nervous imbalance created during sustained emotional strain or conflict.

EDWARD F. LEWISON, M.D.

Synthetic Resin—A New Antacid for the Treatment of Peptic Ulcer. MANFRED KRAEMER and LEO H. SIEGEL. *Arch. Surg.*, 1948, 56: 318.

The discovery by Adams and Holmes, in 1935, that phenolic resins have ion exchange properties, started a revolution in the chemical world. It now became possible to remove both acids and alkalies from solutions without changing the nature of the original solvent. Since these substances are nontoxic for human beings, it was inevitable that they would find a place in medicine.

The authors studied a synthetic resin, "amberlite IR IV" (metaphylene diamine), and believe that it approaches the ideal antacid in that it appears to be as effective as the usually employed salts of calcium, magnesium, and aluminum, but does not produce any of their untoward reactions. It is not absorbed from the digestive tract, has no effect on the acid-base balance, and does not alkalize the urine. It does not affect the bowels or irritate the gastric

mucosa. It neutralizes acid rapidly, and promptly relieves pain. It is effective in small doses and is inexpensive and tasteless.

In the 60 cases studied it was used in doses ranging from 2 to 9 gm. daily for from 6 to 8 months at a time with no evidence of toxicity as manifested by examination of the skin, blood, and urine. Considering freedom from pain as evidence of the healing of an ulcer, 47 of the patients have been benefited by resin therapy. Six patients did not respond well to resin or to any other antacid therapy and required subtotal gastric resection. Three patients did not respond to resin therapy but did well when given other antacids. Two patients were not relieved by resin or other antacids but were kept free of symptoms by nightly aspiration of the gastric contents. Two patients could not be followed up adequately.

JOHN J. CRANLEY, JR., M.D.

Penicillin in the Postoperative Treatment of Peptic Ulcer with Perforation, and Appendicitis with Perforation. ROBERT B. BROWN AND DON L. ANDRUS. *Ann. Surg.*, 1948, 128: 57.

The present report is based on a study of 42 cases of perforated peptic ulcers and 97 cases of perforated appendices. These patients were operated upon at the Philadelphia Naval Hospital during the 18 month period between January 1, 1946 and June 30, 1947. Since the vast majority of these cases were surgical emergencies, operation was performed by the surgical watch officer. All patients received penicillin postoperatively, but in 34 of the 42 cases of perforated peptic ulcer the initial dosage was 100,000 units every 2 hours. Dosage was continued at this level for varying lengths of time—up to 18 days in one patient. The average duration at this level of dosage was 8.5 days. Penicillin was then tapered off, through decreasing dosage, before being discontinued. Four patients received an initial dosage of 50,000 units of penicillin every 3 hours, and the remaining 4 received a still smaller dosage. There were two deaths in this group before the 100,000 units every 2 hours was established as a routine. The usual postoperative regime of support with intravenous fluids and Wangensteen suction was used in all cases.

Of the 97 patients with perforated appendices, 71 received penicillin at an initial dosage level of 100,000 units every 2 hours. The duration of treatment at this level ranged from 1 day to 26 days with an average of 5.3 days. Twenty patients received smaller initial dosages of penicillin postoperatively, while 6 patients in whom contamination of the peritoneal cavity was minimal received no penicillin postoperatively. There was only one postoperative death, a mortality of 1 per cent, among the patients with ruptured appendices, and this was due to a massive intestinal hemorrhage on the fifth postoperative day from a crushed and inverted but unligated stump of the appendix.

It is the authors' opinion that inclusion of penicillin therapy in their routine postoperative treatment of perforated peptic ulcers and perforated appendices has contributed measurably to the low mortality and low morbidity rates for the two groups. Complications due to spread of the existing infection or development of new infectious processes were almost entirely eliminated. In only 1 of the 2 deaths due to a perforated peptic ulcer did infection play a part, and this was an overwhelming peritonitis from the start. The one death from appendicitis was in no way related to the infection. The most noteworthy observation was the absence of wound suppuration in the ulcer group. EDMUND A. GORVETT, M.D.

Nocturnal Gastric Secretion: Studies on Normal Subjects and on Patients with Duodenal Ulcer, Gastric Ulcer, and Gastric Carcinoma. ERWIN LEVIN, JOSEPH B. KIRSNER, WALTER LINCOLN PALMER, and CARRIE BUTLER. *Arch. Surg.*, 1948, 56: 345.

The authors present the results of their studies on the gastric secretion of normal persons and of patients with duodenal ulcer, gastric ulcer, and gastric carcinoma. A greater free activity has been observed in the nocturnal secretion of patients with duodenal ulcer than in that of normal patients.

Studies on the continuous 12 hour nocturnal gastric secretion in normal healthy persons without gastrointestinal complaints have not been reported heretofore.

Studies were made on the nocturnal gastric secretion of 33 normal healthy persons who were known to have no gastrointestinal complaints; 21 of the subjects were males and 12 were females.

There are statistically significant differences between the gastric secretion of normal persons and that of patients with duodenal ulcer, gastric ulcer, and carcinoma, although, as one would expect, there is no overlapping.

The volume of the continuous nocturnal gastric secretion in the group with duodenal ulcers was found to be significantly higher than that in normal subjects. Comparison of the normal group with the small series of patients with gastric ulcer and gastric carcinoma indicates that there is no significant difference in the volume of gastric juice secreted by normal subjects and by those with gastric ulcer. Patients with gastric carcinoma tend to secrete a lower volume of gastric juice than that secreted by normal persons. The continuous nocturnal gastric secretion in patients with duodenal ulcer is much greater than that encountered in patients with gastric carcinoma or gastric ulcer. Patients with gastric ulcer usually secrete a greater volume of gastric juice than do patients with gastric carcinoma.

Similarly, the free acidity of the total nocturnal gastric secretion is much higher in patients with duodenal ulcer than in normal subjects. On the other hand, the free acidity tends to be lower in patients with gastric ulcer and gastric carcinoma than in normal persons. The free acidity of the nocturnal gastric secretion tends to be higher in patients with gastric ulcer than in patients with carcinoma.

The differences in gastric secretion in the groups studied are most evident with regard to the total amount of hydrochloric acid secreted during the night. Those with duodenal ulcer secrete a significantly greater amount of hydrochloric acid than do normal persons. On the other hand, normal persons secrete more hydrochloric acid in the nocturnal gastric secretion than do patients with either gastric ulcer or gastric carcinoma; in both instances the differences are significant. Patients with gastric carcinoma tend to secrete less hydrochloric acid than do patients with gastric ulcer.

The results also indicate a wide individual variation in the volume of gastric secretion and in the output of free hydrochloric acid, even in the same person. However, if the "correlation coefficient" is computed, it becomes apparent that a person with a high secretion on one night will in the majority of instances have a high gastric secretion on successive nights. The same constancy is demonstrated by persons with a low secretory rate.

The great difficulty in ulcer therapy is the control of excessive continued nocturnal secretion. Dragstedt maintains that "the chief abnormality of duodenal ulcer patients lies not in the fact that they secrete more gastric juice in response to the stimulus of histamine or alcohol than do normal individuals, but rather in the fact that they secrete large volumes of highly acid gastric juice when there is no known stimulus to the gastric secretory mechanism." The present data quantitatively confirm these observations with respect to duodenal ulcer (not for gastric ulcer) and are similar to those obtained in the studies of Dragstedt and his co-workers; the two studies were carried out under the same conditions. In a previous investigation Levin, Hamann, and Palmer found that for 28 patients with uncomplicated duodenal ulcer the average volume of the continuous nocturnal gastric secretion was 1,110 c.c., with an average free acidity of 62 clinical units.

The earlier work differs from the present one in two respects: first, all the patients had uncomplicated duodenal ulcer whereas 6 of the present group had abnormal gastric retention; second, all the patients in the earlier study were placed on a Sippy regimen while the tests were being made, whereas in the present investigation the patients were given a clear liquid diet. Nevertheless, the average volume and the average free acidity were similar in the two groups, the difference being only 1.0 clinical unit. It can be safely concluded therefore that the average volume of the continuous nocturnal gastric secretion in patients with duodenal ulcer is between 1,000 and 1,100 c.c., and that the average free acidity is approximately 60 clinical units. HARRY W. FINK, M.D.

The Indication for Emergency Operation in Severe Hemorrhage from Gastric or Duodenal Ulcer. J. ENGLEBERT DUNPHY and STANLEY O. HOERR. *Surgery*, 1948, 24: 231.

The authors direct attention to the fact that conservative measures will not save all patients with bleeding ulcers, but a fair proportion of them may be salvaged by timely surgery.

If one accepts this fact, then two alternatives suggest themselves. One is to operate early upon every patient in whom there seems to be any possibility, however remote, that the hemorrhage may prove fatal. The other is to limit emergency operation to those patients who seem to be bleeding to death. This latter is the course followed by the authors.

The selection of patients for operation depends upon the rate of bleeding rather than the age of the patient, number of previous hemorrhages, or other various factors. A clinical rule adopted is if the rate of bleeding is such that a stable circulation cannot be maintained with transfusions roughly approximating 1,500 c.c. of blood per 24 hours, then spontaneous cessation of the hemorrhage is unlikely, and emergency operation should be undertaken.

Knowledge of the source of the bleeding is most important and should be obtained from the history, clinical findings, previous roentgenograms, and x-ray examination prior to emergency operation. This is considered a prerequisite for this type of surgery in order to prevent a useless operation.

STEPHEN A. ZIEMAN, M.D.

Results Following Subtotal Gastrectomy for Duodenal and Gastric Ulcer. FORDYCE B. ST. JOHN, HAROLD D. HARVEY, JOSE M. FERRER, and R. W. SENGSTAKEN. *Ann. Surg.*, 1948, 128: 3.

Partial gastric resections were performed in 394 individuals for peptic ulcer from 1936 to 1945, inclusive. The authors compare the value of vagus nerve resection versus that of gastric resection.

There were 336 satisfactory results among 394 patients. The basis for the analysis of the unsatisfactory results is presented along with a table showing the postoperative complications. Two tables show the causes of postoperative deaths. A further analysis of additional cases shows that from 1926 to 1935 the results were satisfactory in 73 per cent of 55 cases. From 1916 to 1925, 59 per cent of the results remained satisfactory.

In these decades various operative procedures were carried out for the same pathology. The authors believe that a high percentage of excellent results have followed gastric resection and that resection is a relatively simple procedure in patients under 50 years of age. It must be remembered that after the age of 45, carcinoma must be considered in the diagnosis. The mortality rate from 1916 to 1925 was 20 per cent; from 1926 to 1935 it was 12 per cent; from 1936 to 1945 it was 4.6 per cent; and in the 2 years from 1946 to 1947 the mortality rate was 2.5 per cent. RICHARD J. BENNETT, JR., M.D.

The Use of the Roux Y in Extending the Operability of Carcinoma of the Stomach and of the Lower End of the Esophagus. JOHN T. REYNOLDS and JOHN P. YOUNG, JR. *Surgery*, 1948, 24: 246.

Carcinoma of the stomach frequently extends farther than revealed either by inspection or palpa-

tion at operation. Even with fairly small carcinomas total gastrectomy is the procedure of choice. The utilization of the Roux Y makes possible more radical resections of carcinomas located in the cardia of the stomach. The considerable length of free duodenum obtainable, and the adaptability of the jejunum to esophageal anastomosis make it advantageous in transthoracic resection of the lower esophagus and stomach, also. The facility of manipulation of the loop of Roux Y makes it useful in palliative procedures for nonresectable gastric cancers as well. Since the technical execution of the anastomosis is easier with the Roux Y operation, mortality should be reduced.

Cases illustrating the advantages of the procedure are presented, and technical details are illustrated with twenty drawings. FRANK B. QUEEN, M.D.

Intestinal Suction Treatment. S. S. KROOK. *Acta chir. scand.*, 1948, 96: 562.

Five case histories are explained in detail to show the indications for treatment by intestinal suction. The differential diagnosis between obstruction due to strangulation and simple obstruction is very important. The risk in the strangulation cases is markedly increased in direct proportion to the time that suction is used.

The author states that he has used operations in all obstruction cases and is of the opinion that his results are comparable with the best results obtained by suction treatment. Furthermore, he sees no reason at present to replace operative treatment with successful outcome by suction treatment in mechanical ileus. He does state, however, that suction treatment is of value in postoperative mechanical obstruction in general, following operations on the small bowel and in nonmechanical obstructions of all kinds. Suction treatment aids the maintenance of fluid balance.

RICHARD J. BENNETT, JR., M.D.

Atypical Crohn's Disease. M. J. BENNETT-JONES and G. F. WIGGLESWORTH. *Brit. J. Surg.*, 1948, 36: 66.

Atypical Crohn's disease is usually maximal at the termination of the ileum, gradually diminishing in a proximal direction so that the wall of the ileum becomes gradually normal at about 10 to 14 inches from the ileocecal junction. The main modification of the original description is that the cecum and the ascending colon may also be affected. Most surgeons who deal with emergency cases of abdominal disease have encountered the inflammatory phase which causes the symptoms and signs suggesting appendicitis; it is thought that resolution can occur at this stage because many patients in whom the diagnosis was made by laparotomy only, have remained symptom-free for a year. The obstructive phase of the disease is less common and may be associated with internal or external fistulas; a gross deterioration in the general condition is the rule in these cases.

From the pathological point of view, the disease is not usually difficult to diagnose; generally it conforms to the classical description of the disease by Hadfield, and the diagnosis is made mainly on the macroscopical distribution and the type of lesion, together with a histological picture of chronic nonspecific inflammation with the exclusion of tuberculosis as far as possible. If atypical lesions are to be found in this disease, then difficulties of diagnosis will arise.

The authors present a report of 3 cases of atypical Crohn's disease. Two of them were unusual from a pathologic point of view. CHARLES BARON, M.D.

Anal Ileostomy with Sphincter Preservation in Patients Requiring Total Colectomy for Benign Conditions. MARK M. RAVITCH. *Surgery*, 1948, 24: 170.

In a lengthy differential discussion of the operations in current use for the control of ulcerative colitis, polypoid adenomatosis of the colon, and Hirschsprung's disease, the author recommends anal ileostomy in highly selected cases. Two case histories with x-ray illustrations showing that the patients did well 1.5 and 2 years postoperatively are presented. Sphincter control and absence of cramps were not obtained for about 4 months after the operation, at which time the terminal ilium completed physiological dilatation.

A detailed presentation of the technique is made with many photographs. It is essentially a one-stage complete colectomy, the pelvic floor being remade over the distal segment of the ileum; the latter is sutured to the *in situ* external anal sphincter. (The anal mucosa and submucosa have been previously dissected away in a 2 to 3 inch cuff by a perineal approach.) It represents a modified Babcock pull-through procedure. The procedure may be done in one stage, or in two stages with several months intervening between the abdominal and perineal ileostomy formation.

The procedure offers the most help for patients with ulcerative colitis who need colectomy and permanent ileostomy. JANE C. MACMILLAN, M.D.

A Case of Intestinal Lipodystrophy (Whipple's Disease) Simulating Boeck's Sarcoid. BENJAMIN NEWMAN and RUSSELL H. POPE. *Gastroenterology*, 1948, 11: 120.

A case is presented of moderately advanced intestinal lipodystrophy (Whipple's disease) which was mistaken for Boeck's sarcoid as a result of biopsy early in the disease. A brief summary of the theories recorded in the literature is presented

JOHN J. MALONEY, M.D.

Polyposis (Adenomatosis) of the Colon. PAUL I. HOXWORTH and DANELY P. SLAUGHTER. *Surgery*, 1948, 24: 188.

The experience of surgeons in the operative management of polyposis is reviewed in this article. Seven new cases added to the tabulation of those reported make a total of 35 cases of polyposis found in the American literature since 1930. Analysis of

these shows considerable variability in the chronologic order of the surgical procedures used to accomplish the end results. In some cases the variations were necessary because of manifestations of the disease peculiar to the individual. In others they were caused by failure of the first operator to appreciate the disseminating and premalignant qualities of the disease, attention at first being directed to segmental resection. Among all the cases the only two methods resulting in cure were total ablation of the large bowel and external ileostomy, or total colectomy and ileosigmoidostomy (or ileoproctostomy) combined with fulguration of the lower segment.

It is apparent that no attempt should be made to hold one method of treatment in favor over the other, except as applied to the individual patient. The method which preserves sphincter function is to be preferred provided rigid conditions for its safety are established. Otherwise, it probably should be discarded in favor of the other plan.

Total removal of the large bowel is the method of choice if there is indisputable or even questionable evidence of carcinoma of the rectum or lower sigmoid colon. Even those who favor preservation of the sphincteric mechanism in patients with cancer of the rectum probably would not care to precede ileoproctostomy by fulguration of polyps in close proximity to the cancer. Total removal might also be preferred if the rectum exhibits closely set polyps with marked hyperplasia, ulceration, and secondary infection. Under these conditions areas selected for biopsy may not be representative and carcinoma can be overlooked.

Total ablation may be done in one or multiple stages in accord with the health, age, sex, and obesity of the patient, and his course during surgery.

The review indicates that the use of preliminary external ileostomy in patients known to have carcinoma of the sigmoid or rectum is generally undesirable, because of the long interval imposed by waiting for systemic adjustment or by management of local complications of the ileostomy before curative resection can be done.

Before it is decided to fulgurate rather than to remove the lower sigmoid and rectum, the presence of cancer should be excluded by careful study of the gross morphology of the mucosa well beyond the rectosigmoid region and of the microscopic anatomy of sections obtained from representative areas. Early carcinoma *in situ* may be difficult to recognize in some cases.

The features distinguishing polyposis of the colon as a disease entity are its tendency to occur in certain families, the diffuse involvement of the colon with polyps, and the propensity of the lesions early to undergo malignant change. It can be differentiated from the more frequent occurrence of isolated polyps, cancer, and inflammatory diseases of the colon and rectum by a careful history, stool examinations, sigmoidoscopy, and roentgenologic study after barium and air enemas.

The cure of polyposis depends upon the recognition of this disease entity and its differentiation from other diseases before surgical management is planned. Failure to do this may result in inadequate treatment. Surgery should be directed toward either total ablation of the large bowel or total colectomy and ileosigmoid (ileorectal) anastomosis combined with fulguration of the polyps in the preserved segment.

Early recognition of the disease and the increased amount of surgery that can be performed in one stage because of modern therapeutic adjuncts to intestinal surgery combine to give an improved prognosis in polyposis of the colon. STEPHEN A. ZIEMAN, M.D.

Spreading Ulceration of the Skin Associated with Idiopathic Ulcerative Colitis. E. C. B. BUTLER. *Proc. R. Soc. M.*, Lond., 1948, 41: 474.

Progressive ulceration of the skin is a rare but important complication of ulcerative colitis. In the 2 patients whose cases are reported, the ulceration was severe, but it is evident from the literature that all grades of skin involvement may occur in association with ulcerative colitis. Other mild cases have been observed in which the ulcers were not painful and healing occurred rapidly with rest and chemotherapy. In the 2 cases presented, the clinical picture was unmistakable. It is the author's belief that these severe skin lesions may endanger the life of the patient.

The ulceration seems to occur in patients who have suffered from colitis over a considerable period of time. In the author's cases, and in others reported elsewhere, the skin ulceration commenced during an exacerbation of the colitis, as shown by pyrexia, diarrhea, and rectal bleeding. Healing of the ulcers appeared to depend on cessation of the active phase of the colitis—following medical treatment in one case and following colectomy in the other. In the second case a relapse of the colitis was accompanied by exacerbation of the skin ulceration.

These facts clearly suggest that the skin lesions are, in some way, linked with the colitis. It is possible that several factors are involved. First, there may be a deficiency due to a lack of biosynthesis of certain vitamins in the diseased bowel; secondly, the original skin lesion may be an allergic phenomenon similar to that which originally may have caused the colitis. This view is supported by the fact that in one case the discharge from the ulcer was sterile for several days, which was against a diagnosis of primary bacterial infection. Thirdly, lowered resistance of the patient to infection, coupled with secondary anemia, undoubtedly promotes the incidence of the severe secondary infection which so often occurs in these cases.

In the first case, cultures from the lesion were sterile for some days before pyogenic infection occurred. The second patient was not admitted to the hospital until secondary infection was well established. Cultures showed, at various times,

staphylococci, hemolytic streptococci, Bacillus proteus, and Bacillus pyocyaneus. The lesion begins as a raised red papule which rapidly breaks down to form a small ulcer. In mild cases no further spread may occur, but in others the discharge becomes profuse and the ulcer rapidly increases in size. Severe pain is a predominant symptom. The commonest sites for infection to occur are the limbs but any part of the body may be affected. Unless the condition is checked the ulcer may spread until the patient is in danger of death from toxemia and anemia. Spontaneous arrest may take place if there is clinical improvement in the colitis, but in severe cases energetic local and general treatment is required to halt the spread of the ulceration. Once the infective process has been healed epithelium rapidly grows in from the edge of the ulcer, but skin grafts may be required when the lesion has been extensive.

Severe lesions must be treated vigorously; the first patient nearly died because the diagnosis was not made early enough. If the colitis is in an acute stage medical treatment will probably suffice. Diet should include a high protein content, low residue, and plenty of essential vitamins. Oral sulfonamides and systemic penicillin should be given; in the author's 2 cases, however, the results from chemotherapy were disappointing. It is possible that larger amounts of penicillin, say one million units daily, might have given a more favorable result. Repeated blood transfusions are essential to combat the secondary anemia. If the patient does not improve, ileostomy should be considered. In more chronic cases (as in Case 2) surgical treatment may be required more frequently since the skin lesions may relapse with each exacerbation of the colitis. Ileostomy may be required and colectomy is often advisable. Locally the treatment which appeared to stop the spread of the ulceration was excision of the whole of the edge with a diathermy knife. The result was dramatic, pain vanished, the edge of the ulcer became clean and clear-cut, and the response to local chemotherapy was good.

At operation the limbs should be raised to avoid considerable blood loss from venous oozing. These patients do not tolerate loss of blood and every effort should be made to prevent undue hemorrhage. Blood transfusion is advisable during the operation. Excision with an ordinary knife may be equally satisfactory, but the diathermy appeared useful in the prevention of blood loss. Complete excision of the whole ulcer, including the base, followed by immediate skin grafting may be successful. Postoperative therapy consists in repeated application of penicillin sulfonamide powder with early skin grafting if necessary. CHARLES BARON, M.D.

Congenital Obstruction of the Colon in an Adult. DOUGLAS K. REID. *Brit. J. Surg.*, 1948, 36: 52.

A case is described in which chronic intestinal obstruction in an adult was found to be caused by two congenital diaphragms of the ascending colon.

The commonly accepted etiology of both atresia and stenosis concerns the epithelial proliferation which takes place in the second month of fetal life, to the extent of obliteration of the lumen, which later becomes re-established by absorption of excess tissue. Incomplete reabsorption can readily be understood to leave behind such diaphragms as are described in the present case.

Congenital occlusion of any part of the gastrointestinal tract is an extremely rare cause of symptoms in adult life. CHARLES BARON, M.D.

Urologic Complications of Left Colon Surgery. CLARENCE G. BANDLER and PHILIP R. ROEN. *Ann. Surg.*, 1948, 128: 80.

Urologic complications of surgery of the descending colon, particularly in abdominoperineal resection, are more frequent than is commonly acknowledged. An incidence of 30 per cent of urinary complications would seem to be average, and three-fourths of these cases occur in males. The urinary tract complications include injury to the ureter with resultant ureteral fistula, trauma to the bladder causing vesical urinary fistula, and vesical dysfunction.

Ureteral damage occurs more often on the right side, probably because the surgeon working on the descending colon is more meticulous in identifying the left ureter. When ureteral injury occurs and is at once recognized at the time of the colon surgery, end-to-end anastomosis or repair of the ureteral opening should be made over a splinting catheter, the end of which is passed down into the bladder and removed cystoscopically at a later date when healing has been established.

When bladder invasion by the carcinomatous tissue is found either at preoperative cystoscopy or during operation, the location of the invaded area will determine whether the situation is "operable" or not. When the dome or posterior wall is involved, partial resection of the bladder may be performed. When the malignancy involves the trigonal area, the prostate, or seminal vesicles, the condition is usually "inoperable." Inadvertent injury to the bladder wall may occur incidental to the operative procedure on the colon. A suture may be taken through the bladder wall with subsequent necrosis and the production of a vesicle fistula. Conservative management with the use of an indwelling catheter is indicated and spontaneous healing will occur as a rule.

The most common urinary complication is the bladder which is unable to empty itself, which becomes infected, or both. This is due to (1) injury of the autonomic nervous system during excision of the distal colon, (2) direct trauma to the bladder, (3) prostatic obstruction, or (4) postoperative sagging of the bladder.

Postoperative management consists of insertion of a soft self-retaining catheter, 16 to 18 F., for about 5 days. If at the end of this period residual urine in excess of 100 c.c. is noted, the catheter should be reinserted. Sulfadiazine (gm. 0.5) every 4 hours with an equal amount of sodium bicarbonate should

be given to combat the inevitable infection. If vesical neck obstruction is present, transuretheral resection should be performed.

ELY ELLIOTT LAZARUS, M.D.

The Role of Hypertrophy of the Muscularis in the Delayed Onset of Symptoms in Cancer of the Colon. JOHN ARMES GIUS. *Surgery*, 1948, 24: 221.

Struck by the fact that carcinoma of the colon can progress to an incurable stage before the patient (even a fellow surgeon) becomes aware of his trouble, Gius undertook a study to elucidate the reason for this lack of symptoms. A perusal of the literature showed that Nothnagel had ascribed the absence of symptoms to hypertrophy of the colon. Experimentally, Herczel had shown that detectable hypertrophy of the muscles resulted from incomplete obstruction after 5 days while grossly visible hypertrophy was observed in 9 days. It was emphasized that hypertrophy and not hyperplasia is the essential change.

Although Morrison and Saint (1935) as well as Osgood (1940) had discussed the principle of muscle hypertrophy and compensation as it applies to stenosis in hollow viscera and stressed its fundamental importance, this concept has been either forgotten or regarded as of only academic interest. In fact, no reference to this work is made in textbooks and standard works pertaining to medicine and surgery.

During the past year Gius studied about 20 unselected specimens of cancer of the large bowel. Inspection revealed gross thickening of both the circular muscle layer and of the longitudinal tenia. This thickening was most marked in the proximal bowel and increased in size as the tumor was approached. There was also some increase in the thickness of the muscle wall below the tumor. Microscopic sections were taken 5 cm. from the tumor margin through the wall proximal and distal to the tumor. The muscle layers were increased in thickness without evidence to indicate that edema or cellular infiltration was responsible for this change. The cytoplasm of the individual muscle cells was increased, was somewhat paler-staining than the cytoplasm of normal cells, and appeared vacuolated. The nuclei were elongated and larger than normal. They were spaced at greater intervals and were hyperchromatic.

Thickening of the muscle coat of the large bowel proximal to a cancer of the colon with stenosis was an impressive finding. The extent of muscular thickening appeared to be related to the duration and degree of stenosis and was the logical result of the increased work demanded of the muscle. It is believed that the effects of the stenosis may be minimized by the increased propulsive power of the bowel wall and thus the symptoms of increasing obstruction are masked for some time. This mechanism of compensation may delay the onset of significant symptoms until curative surgery is no longer possible.

ROBERT TURELL, M.D.

Cancer of the Colon. Elective Surgical Treatment (Cancer del colon. Eleccion de operación para su tratamiento). J. GARCÍA MORÁN. *Rev. espan. cir.*, 1948, 5: 17.

The author discusses the decreased mortality following surgical treatment of cancer of the colon. This improvement is attributed to earlier diagnosis, the use of antibiotics, better general anesthetics, and to the better knowledge of preoperative and postoperative management. He mentions the findings of Puig-Sureda of Spain, who, in 60 colectomies, has had no mortality. The author discusses the anatomical irrigation of the colon, the incidence of localization of the tumors in the colon, and the common development of cancer in polyps of the bowel.

Different methods of surgical treatment are indicated, according to the location of the tumor in the colon. In cancer of the cecum and ascending colon, resection of the terminal ileum with the ascending colon and cecum is performed; tumors of the transverse colon usually are resected and an end-to-end anastomosis is established; in cancer of the splenic flexure, a transverse colostomy or a cecostomy previous to the resection is advised; and in cancer of the descending and pelvic colon a resection with an end-to-end anastomosis is carried out.

WILLIAM E. RICKETTS, M.D.

Rectal Prolapse (Prolapso rectal). PABLO H. MEYER. *Arch. Soc. cir. hosp.*, Santiago, 1948, Supp. 16: 223.

The author discusses the results obtained with different methods of surgical treatment in 11 cases of prolapse of the rectum. In cases in which the prolapsed rectum presents signs of strangulation, and in which multiple and extensive ulcerations occur in the prolapsed mucosa, or those in which the prolapse is due to a malignant tumor, the elective treatment is either resection or extirpation. In other cases, various methods of colpopexy, such as the Quénu-Duval or Mayo operation, or the perianal operation of Lockhart-Mummery, were found to be the most valuable. WILLIAM E. RICKETTS, M.D.

Evaluation of Colorectectomy and Immediate Anastomosis of the Rectum. R. RUSSELL BEST. *Arch. Surg.*, 1948, 56: 681.

Forty years ago, the objective in extirpation of rectal carcinoma was preservation of the sphincter mechanism and re-establishment of bowel continuity, except when the anal canal was primarily involved. At that time, a wider excision of tissues in the zones of lymphatic spread, accomplished by the more radical abdominoperineal excision, including the entire area of the sphincter muscle, and establishment of a permanent abdominal colostomy resulted in a decided increase in the percentage of cures. This Miles operation, in one or two stages, continues to be the most popular procedure.

Sporadic attempts are constantly being made to develop a technique which would be sufficiently radical to extirpate all malignant tissue, and yet would preserve the mechanism of the sphincter

muscle. The true basis for the renewed attempts at re-establishing bowel continuity is the study of lymph nodes in this type of malignant condition. This reveals that dissemination of cancer cells of the rectum in a downward direction is unusual, unless the nodes above the tumor are blocked by metastases.

The intramural spread of cancer cells below the margin of the tumor also is rare. A clearance of from 1 to 2 inches is usually a safe margin. Laterally, lymph nodes extend outward over the upper surface of the levator ani muscle to the hypogastric nodes, and cancer cells could spread into these nodes. In lesions situated in the last 3 inches of the rectum, removal of at least part of the levator should be considered. With lesions at the 3 inch level or higher in the rectum, the levator fascia and muscle should be excised.

In the evaluation of procedures for preservation of sphincter muscle and function, one must examine the rates of mortality, 3 and 5 year survival and morbidity, the degree of continence, and the element of impotence in males. The incidence of mortality reported in the one stage abdominoperineal resection and in the various types of radical abdominoperineal operations with sphincter preservation varies from a low of 4.9 per cent to a high of 12.1 per cent.

With use of the radical abdominoperineal excision that Miles advocated, the 3 and 5 year cures average about 50 per cent. Satisfactory and comparable results of the sphincter preservation operation, however, cannot be determined until another 5 or 10 years have passed.

At present, it appears that satisfactory continence may be expected in from 80 to 90 per cent of cases in which anastomosis is completed in sphincter-saving procedures.

Impotence in males is a very frequent complication following abdominoperineal resection. This complication does not arise as frequently when the sphincter is preserved.

If an operation of the anastomotic type is decided upon, one of three procedures may be selected: (1) abdominal dissection, resection, and anastomosis; (2) abdominal dissection with perineal resection and anastomosis; and (3) perineal dissection with perineal resection and anastomosis. In lesions of the rectosigmoid, and immediately adjacent lesions of the upper part of the rectum, dissection and anastomosis can be accomplished from within the abdomen. Likewise, lesions lower than the upper part of the rectum—within 2 inches—can be resected and abdominal anastomosis accomplished, but lesions at the 3 inch level (midrectal) should have abdominal dissection and posterior resection with anastomosis to insure adequate removal of lymph nodes or infiltrated tissues of the levator ani muscle and fascia. The strongest support for perineal dissection with perineal resection and anastomosis is its expediency in a patient who is a poor risk.

SAMUEL KAHN, M.D.

Resection of Rectum and Rectosigmoid with Preservation of the Sphincter for Benign Spastic Lesions Producing Megacolon. ORVAR SWENSON and ALEXANDER H. BILL, JR. *Surgery*, 1948, 24: 212.

By the use of special roentgenologic technique it was possible to demonstrate an area of spasm in the rectosigmoid or rectum at the lower limit of the area of dilatation of the colon in 20 patients with a clinical diagnosis of Hirschsprung's disease, or congenital megacolon.

The disease was characterized by severe constipation, with bouts of obstipation, dating back to early infancy and tending to become more severe and distressing as the children grew older. Malnutrition in various degrees was present. The length of bowel involved and the degree of spasm probably account for the variations in the severity of the disease.

In the milder cases, treatment with a regimen of mecholyl, mineral oil, and enemas was successful. In the severe form of the disease, excision of the spastic area of the bowel with re-establishment of bowel continuity offers a satisfactory means of treatment. A method of resection which permitted removal of the rectosigmoid and rectum with preservation of the anal spincter is described.

After animal experimentation with excellent results, 3 children were subjected to resection in which the bowel was divided just above the constricting area. The distal segment was everted through the anus and a small transverse incision made 2 cm. from the anal skin. By means of a long forceps the proximal bowel segment was pulled down and anastomosed to the distal portion, the redundant pouch and spastic area being removed. The bowel was then put back into the pelvis, the peritoneum sutured about it, and the abdominal incision was closed. Normal bowel movement without the aid of diets, laxatives, enemas, or therapy followed.

It is concluded that the method will be a useful adjunct in the treatment of benign lesions of the rectum and rectosigmoid, such as severe spasm. It may have no place in the treatment of carcinoma, except perhaps for localized small lesions.

In the technique of the operation, the most important step is to be certain that the blood vessels to the proximal end of the bowel are of adequate length to permit the sigmoid to be pulled out through the anus. It is also important that the anastomosis be done in two layers with extreme care, to make sure that there be no leakage into the pelvis.

STEPHEN A. ZIEMAN, M.D.

Rectal Cancer and the Preservation of Function. E. G. MUIR. *Brit. M. J.*, 1948, 2: 286.

There is a sound pathological basis for operations which aim at preserving a functioning anus in high rectal and rectosigmoid growths but, even in early cases and with adequate excision, carcinoma can reappear at the anastomotic site.

To be certain of continence, the anorectal ring must be preserved. Of the various methods devised, abdominal resection, anastomosis, and a pull-through

resection appear to be preferable. A preliminary transverse colostomy lessens the risk and dangers of infection, and should always be employed.

The use of sulfonamides and penicillin has reduced the mortality, with all methods of rectal resection, to a low figure. SAMUEL KAHN, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Experimental Repair of Common Duct Defects Utilizing a Free Vein Graft Over Blakemore-Lord Tubes. PATRICK C. SHEA, JR., and CHARLES A. HUBAY. *Ann. Surg.*, 1948, 128: 21.

The treatment of common duct stenosis is difficult in itself, but becomes increasingly so when a defect must be bridged. Many methods of repair have been devised using vein grafts, fascial grafts, rubber tubes, vitallium tubes, and adjacent hollow viscera. These methods have not proved completely satisfactory since bile encrustations, contraction, or complete stenosis and obstruction have resulted.

The authors experimented on dogs, bridging common duct defects by the employment of a free vein graft over a Blakemore-Lord tube. It was postulated that epithelization of the intima of the vein segment with biliary tract epithelium would occur, and that the blood supply to the graft would be supplied by vascularization of connective tissue and from peritonization of the graft and surrounding area.

The series comprised 21 dogs, all of which were examined after death or sacrificed at the end of the experimental period. All dogs that survived the experimental period of 10 to 120 days showed the graft to be completely covered with peritoneum, and in 66.7 per cent of the total number of animals the bridging channel remained functionally patent and a free flow of bile was maintained.

ELY ELLIOTT LAZARUS, M.D.

Conservative Therapy of Residual Calculi Following Operations on the Common Bile Duct. GERALD H. AMSTERDAM and JULIAN A. STERLING. *Ann. Surg.*, 1948, 128: 30.

The authors state that several reports have been published on the occurrence of residual choledocholithiasis following operations on the common bile duct. The stones may not have been observed, or may have been inaccessible at the time of operation.

These calculi can produce total obstruction to bile flow, although the obstructive phenomena are usually incomplete and intermittent. Some stones may disintegrate; others may pass into the gastrointestinal tract through the papilla of Vater or via a fistula; others still may become imbedded in the wall of the papilla or may remain as asymptomatic foreign bodies.

It is advisable to avoid secondary procedures on the biliary tract since the risk of reoperation is great and the technical procedure is frequently very difficult. Lavage of the common bile duct through an individual "T" tube can be expected to produce excellent results in the therapy of residual choledocholithiasis, if given a trial for a sufficient length of time.

The technique consists of irrigating the common bile duct with 3 to 4 c.c. of ether one or two times daily. It should be noted that ether boils at body temperature, and this phenomenon may cause discomfort since the expanded vapors can exert considerable pressure. If discomfort occurs, the syringe may be disengaged and the ether permitted to bubble out the open end of the "T" tube. Nitrites may be administered for the relief of pain, or to relax sphincteric action.

Two cases of residual choledocholithiasis are reported. In one of these, daily instillations of ether for a period of 2 months were followed by disappearance of the stone; in the other, instillations were continued for 7 months.

ELY ELLIOTT LAZARUS, M.D.

Operative Diagnosis of the Indurations of the Duodenopancreas (Diagnóstico operatorio de las induraciones del duodeno-páncreas). LORENZO H. MARTIARENA. *Prensa méd. argent.*, 1948, 35: 981.

The continuous advances in the diagnosis and treatment of lesions of the head of the pancreas have led to a modification of the topographic concepts of the area, and to the creation of a new anatomic entity, the duodenopancreas, which consists of the second portion of the duodenum and the head of the pancreas, and possesses a neurovascular individuality which facilitates the operative diagnosis of indurations of the area and the treatment to be applied. Since tumors as well as inflammations of the area produce similar indurations, the author has endeavored to establish clearly an operative differentiation between them in order to avoid the previously made mistake of performing pancreatectomy in an inflammatory process. To improve the possibilities of correct diagnosis, any surgeon who performs a laparotomy should also do a routine palpation of the head of the pancreas to enable him to recognize its normal consistency; as a result he will find it easier to locate a lesion which has remained silent.

To make a good exploration of the area it is necessary to retract the stomach and liver upward and the transverse mesocolon downward, and to palpate the region by inserting the index and middle fingers behind the duodenopancreas (in the dihedral angle formed by the peritoneum on passing from the external aspect of the second portion of the duodenum to the posterior wall), and placing the thumb in front. The normal pancreas has a consistency similar to that of the intestine which surrounds it. When an induration is discovered or suspected, an opening must be made through the gastrocolic epiploon, freeing the stomach from the transverse colon in its right half and exposing the duodenopancreas and the remainder of the pancreas.

Once the presence of a pancreatic induration is confirmed, it should be classified as being purely pancreatic, or duodenopancreatic, or belonging to the region of Vater's ampulla. The symptomatology of each type will furnish information of great interest, but the clinicosurgical pictures will be of greater importance. They include:

1. Patients presenting symptoms and the diagnosis of biliary lithiasis but without jaundice, in whom at operation calculi are found in the gall bladder, and a nodular induration is observed in the head of the pancreas. These are cases of chronic pancreatitis secondary to lithiasis.

2. Patients presenting the same symptoms but with jaundice, in whom operation reveals gall bladder or choledochus lithiasis with induration in the head of the pancreas, either nodular or total, generally elastic and with hardly any increase in size. Choledochotomy should be performed to make sure that the induration is not due to calculus, in which case there is again a secondary pancreatitis.

3. Patients with painless jaundice and a diagnosis of tumor of the biliary or pancreatic ducts, in whom the biliary ducts at operation are found to be of normal appearance, whether dilated or not, and an induration of the duodenopancreatic area is revealed. The chances are that the induration is due to cancer.

The maneuvers that should be carried out in the exploration of the duodenopancreatic induration are the following: exposure of the duodenopancreas; trocar puncture of the induration; biopsy of the pancreas (this was done in 15 cases); biopsy of peripancreatic lymph nodes; biopsy of hepatic metastases if they are not of typical aspect; and exploratory duodenotomy (this was done in 8 cases).

Tumors of the head of the pancreas were observed in 57 cases. They may involve the entire head (this occurred in 45 cases) or only part of it. These lesions develop around the choledochus, are called choledochopancreatic tumors, and were found in 11 cases. Those in the lower half of the head, called infracholedochal tumors, are rare and one typical case was observed. Eight cases of duodenopancreatic tumors were studied. Tumors in the region of Vater's ampulla were found in 9 patients and could be felt by palpation or recognized at the level of the second portion of the duodenum, as demonstrated in 7 cases; the other 2 tumors were not palpable and were discovered only through an exploratory duodenotomy. RICHARD KEMEL, M.D.

Acute Pancreatitis—A Critical Analysis of 15 Cases. FRANK W. BLATCHFORD, JR., and FREDERICK CHRISTOPHER. *Q. Bull. Northwest. Univ. M. School*, 1948, 22: 198.

A critical review of 15 cases of acute pancreatitis in patients seen at the Evanston Hospital, Evanston, Illinois, from 1938 to 1947, inclusive, is given by the authors.

The great frequency with which this disease is associated with biliary tract disorders has been noted. Removal of a diseased gall bladder and of gall stones is the logical prophylactic treatment of pancreatitis. Four cases of obstruction of the common duct secondary to acute pancreatitis are presented in support of the view that acute as well as chronic lesions of the pancreas can obstruct the common bile duct.

The great importance of the serum amylase test as the only pathognomonic sign of acute pancreatitis is emphasized.

From this study it appears that conservative (nonsurgical) treatment is preferable in cases of acute pancreatitis. Surgical treatment is to be considered in cases of pancreatic abscess and when there is continued and increasing evidence of sepsis.

JOHN J. MALONEY, M.D

Chronic Relapsing Pancreatitis. R. E. HORTON. *Guy's Hosp. Rep.*, Lond., 1948, 96: 226.

The clinical picture of acute fulminating pancreatitis is well recognized by all physicians; however, the author of this article stresses the point that there is a gradation of severity from the familiar acute phase of the disease to a less often recognized subacute pancreatitis, which is characteristically a relapsing disease.

In the course of the inflammatory process, pancreatic tissue is destroyed. Healing takes place by replacement of pancreatic parenchyma with fibrous tissue, and some regeneration of epithelium also takes place. Successive attacks are followed by an increasing replacement of parenchyma with abscess formation. Impairment of pancreatic function and calcification of areas of fat necrosis are the result of recurring attacks.

The clinical picture may be difficult to recognize and, in typical cases, closely resembles recurrent cholecystitis with cholelithiasis. Recurrent severe upper abdominal pain is characteristic. Jaundice is uncommon and a normal cholecystogram is usual. An elevated serum amylase or lipase is almost pathognomonic of pancreatitis, but must only be relied upon early in the course of the disease.

Treatment may be summarized by stating that an operation of internal biliary drainage offers a fair chance of curing the symptoms. Should this be unsuccessful, thoracolumbar sympathectomy may be performed. Pancreatectomy should be reserved for patients suffering from severe pain which is unrelieved by less radical measures.

Seven cases of relapsing pancreatitis are reported by the author. One patient died in a more acute attack; 4 others were treated by cholecystenterostomy, and one of these died following operation. The other 3 patients have been relieved—2 completely and 1 incompletely. Two patients continue to be observed. EDWARD F. LEWISON, M.D.

Tumors of the Spleen and Pseudotumors of the Spleen (Rates tumorales and pseudo-tumorales). EMILE HOUKE and MICHEL FONTAN. Bruxelles med., 1948, 28: 903.

The authors present 3 similar case histories complete with a microscopic description of lympho-

sarcomas of the spleen representing true primary tumors (Cases 1 and 2), and contrast them with "pseudotumors" of the spleen caused by splenic thrombosis (Case 3). In a review of the cases, the authors conclude that there are few clinical clues to decisively determine which type of splenic enlargement is present prior to operation, but an elaborate histologic characterization of the two types of tumors is given.

In the first case a lymphosarcoma, grossly about 14 times normal size, was filled with millimeter-sized nodules which surrounded the central vessels. The malphigian corpuscles could not be distinguished and the nodules were composed microscopically of lymphoblasts, thus presenting the characteristics of a lymphoblastic sarcoma.

The second true splenic tumor described was also a lymphosarcoma having a similar gross and surgical appearance to the first described lymphosarcoma, but the predominant cell type was a small round-cell, uniformly dispersed throughout the organ and comprised of lymphocytes of more nearly adult age.

The third case was one of splenic thrombosis in which the removed spleen was about seven times the normal size and, except for marked hemorrhage on cut surfaces, was not strikingly characteristic in gross pathological description.

Photomicrographs are shown to illustrate a congestive type of splenomegaly without reticular hypertrophy, with hemorrhage as the predominant characteristic.

The authors indicate that they have obtained satisfactory surgical results in the removal of true tumors of the spleen, but that the pseudotumors, as they term the intrasplenic thromboses, can be remedied only if operation is done early, before thrombotic processes have extended into the splenic or portal veins. They believe that there is a considerable latent period in the splenic thromboses of the infectious type, which may continue for a considerable length of time before extension develops, this stage of latency being characterized by splenomegaly only. The authors present the idea that this should be considered as a syndrome, and an indication for splenectomy before fatal extension of the thrombosis occurs. JANE C. MACMILLAN, M.D.

MISCELLANEOUS

Experimental Biliary Peritonitis (Sul coleperitoneo sperimentale). GASPARE BUCCELLATO. *Policlinico, sez. chir.*, 1948, 55: 32.

Eighteen dogs were divided into 7 series and treated by ligation of the common bile duct, injection of the gall bladder with cultures of the Bacillus coli, cultures of the Bacillus Eberth, extracts containing pancreatic enzymes, sterile glycerine, or combinations of these procedures. The experimental period varied from 7 hours to 33 days.

Histopathological examinations revealed no evidence of the passage of bile through the wall of the gall bladder, notwithstanding the presence of edema, necrosis, ulceration, and septic thrombi. Biliary peritonitis was found only in a single animal in which gross perforation of the gall bladder as well as of two intrahepatic ducts had developed. It was concluded that biliary peritonitis does not occur without perforation. The cause of perforation is a constitutional predisposition, with the determining factors of biliary stases, reflux of the pancreatic juices, or the presence of infection in the gall bladder.

EDITH B. FARNSWORTH, M.D.

GYNECOLOGY

UTERUS

The Application of a Silver Carbonate Stain for the Diagnosis of Uterine Cancer by the Vaginal Smear Method. H. S. YUE, G. M. RILEY, NORMAN F. MILLER, and K. SCHARENBERG. *Am. J. Obst.*, 1948, 56: 468.

The diagnosis of cancer of the uterus by the vaginal smear method is based on the fact that the superficial cell layers of the tumor are subject to early and continuous exfoliation. The malignant cells, once separated from the parent tissue, become mixed with the secretions of the uterus and cervix, find their way into the vagina, and may be recognized in properly stained smears of the vaginal fluid.

A review of the criteria diagnostic of malignancy indicates that much reliance is placed upon cell conformation, cellular arrangement, and nuclear characteristics. Obviously, any stain or combination of stains which would uniformly delineate cellular outline and afford contrast between the nucleus and cytoplasm could be satisfactorily applied to the vaginal smear technique.

The silver carbonate stain method of Hortega was modified for staining the cellular elements of vaginal smears. The affinity of chromatin material for the silver stain, together with the usual hyperchromatic character of atypical cells makes this a useful stain in the diagnosis of cancer by the vaginal smear method.

JOHN R. WOLFF, M.D.

Aspects in the Treatment of Vulvar and Cervical Carcinoma. GRACE C. DONNELLY and W. A. G. BAULD. *Am. J. Obst.*, 1948, 56: 494.

This report is a survey of carcinoma of the vulva, carcinoma in the cervical stump, and selected cases of carcinoma of the cervix treated by irradiation and surgery at the Radium Clinic, Royal Victoria Montreal Maternity Hospital, McGill University, Montreal, Canada.

Treatment of the inguinal glands either by surgery as recommended by Taussig, or by x-ray irradiation as is now being done in this Clinic, should be the initial treatment of carcinoma of the vulva and is to be followed by vulvectomy. Local recurrences of carcinoma of the vulva, particularly after vulvectomy, have been few. On the other hand, subsequent inguinal gland metastasis have not been infrequent.

The reported incidence for true stump cancer at this Clinic is, in relation to all cases of carcinoma of the cervix, 4.21 per cent. The incidence in relation to subtotal hysterectomy is 1.2 per cent. Thirty-nine per cent of 28 patients with true stump carcinoma were known to have had bilateral oophorectomy with the subtotal hysterectomy, and therefore could reasonably be considered to have had no ovarian tissue at the time the carcinoma developed.

There were no cases of true cervical stump carcinoma in stage 1. The majority were in stages 3 and 4. These figures suggest that the patient may develop a false sense of security following operation and be more prone to disregard subsequent symptoms.

The majority of cases of cervical carcinoma were treated by radium irradiation and panhysterectomy. There was no dissection or extirpation of the glands or other pelvic structures. This group includes stage III cases. The survival rate has been improved by the use of this method. In a selected series treated in this way the 10 year cure rate was 41.6 per cent.

JOHN R. WOLFF, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Theca Cell Tumors of the Ovary with a Report of 15 Cases and a Review of the Literature. WILLIAM R. KNIGHT, III. *Am. J. Obst.*, 1947, 56: 311.

Fifteen cases of theca cell tumor of the ovary seen at the Wisconsin General Hospital, Madison, are reported. These cases were discovered by reviewing all specimens previously called fibroma of the ovary. The distinctive diffuse yellow color seen on section of the theca cell tumors is the best gross diagnostic criterion and was present in all of the cases.

This tumor occurs most frequently in the fifth and sixth decades, 61.5 per cent of the patients being past 50 years of age.

In the one case so analyzed, estrogenic substances were found in the tumor. Progesterone was not present in the tumor nor was pregnandiol found in the urine. Although the estrogen produced by the thecoma is small, its effect is prolonged and unopposed by the action of progesterone, which may account for the symptoms and frequent occurrence of associated conditions, such as menstrual irregularities, postmenopausal bleeding, endometrial hyperplasia, adenomyosis, hypertrophy of the myometrium with uterine enlargement, uterine myomas, and endometrial carcinoma.

Uterine curettage should be done in all cases to rule out associated adenocarcinoma of the endometrium.

Conservative surgery is the procedure of choice in the premenopausal patient in the absence of associated adenocarcinoma of the endometrium. In the presence of the latter, total hysterectomy is always the operation of choice.

The collected evidence is not conclusive as to whether theca cell tumors represent a distinct histologic type of ovarian neoplasm. This subject warrants further study since the active principle of both theca cell tumor and granulosa cell tumor is estrogen.

JOHN R. WOLFF, M.D.

Solid Teratoma of the Ovary, with Report of 5 Cases. EDMUND R. NOVAK. *Am. J. Obst.*, 1948, 56: 300.

Although dermoid cysts of the ovary are common, their malignant counterpart, the solid teratoma or

teratoblastoma, is decidedly rare. Of the 5 cases reported by the author, 1 was a private one; 2 were from the gynecological service of the Johns Hopkins Hospital, and 2 were from the Lane Home for Invalid Children at the Johns Hopkins Hospital and were the only cases encountered in these institutions in the past 20 years.

The histologic differentiation between dermoid and teratomatous tumors is sometimes difficult. The word teratoma should be confined exclusively to the solid type of tumor and should be considered malignant by definition.

Teratomas are highly malignant neoplasms, from 50 to 75 per cent of them terminating fatally. They occur most often in young individuals and are usually unilateral. Although encapsulated they tend strongly to perforate the capsule, and spread both by extension and metastasis.

Radiotherapy seems to help very little. The treatment of choice is still radical surgery and deep x-ray therapy. In 4 of the 5 cases reported, the patients died. In the fifth case, it was difficult to say whether the tumor was a teratoma or a slightly malignant dermoid tumor. JOHN R. WOLFF, M.D.

EXTERNAL GENITALIA

Use of the Vaginal Smear as a Screening Test. HERBERT L. LOMBARD, MARGARET MIDDLETON, SHIELDS WARREN, and OLIVE GATES. *N. England J. M.*, 1948, 239: 317.

This article is a preliminary report on a study being conducted by the Massachusetts Department of Public Health to evaluate the vaginal smear method of cancer diagnosis. In a 2.5 year period 3,586 women were examined. There were 434 patients with a known history of uterine cancer, 123 patients with known cancer in the organs adjacent to the genital tract, and 153 patients in whom the smears were unsatisfactory for examination. Of the remaining 2,876 patients, 1,364 gave symptoms suggestive of gynecologic disorders, and 1,512 had no symptoms.

From the 1,512 patients without symptoms there were 8 positive smears, but only 3 were confirmed by biopsy. From the 1,364 patients with gynecologic symptoms there were 133 positive smears, 89 confirmed by biopsy; in 17 a clinical diagnosis of carcinoma was made without biopsy. There were 27 patients in whom a diagnosis of carcinoma could not be made.

The authors review the results in the large series of cases presented by Papanicolau and Traut, Meigs, and Gates and Warren. The errors encountered show that a false negative diagnosis is made from 5 to 20 times more frequently than a false positive diagnosis. Careful re-evaluation of the smears which were only suggestive showed errors in diagnosis. However, the smears which showed atypical but not distinctly malignant cells were reported and biopsy was recommended. There were 261 cases in this category, but the follow-up has not been of sufficient time to show whether these will eventually be premalignant lesions.

The authors believe that the vaginal smear method will not bring out many cases in apparently well persons, but that its use has widened the understanding of the early symptoms and signs of carcinoma. GEORGE B. BRADBURN, M.D.

Primary Melanoma of the Vagina, with a Review of the Literature. ROBERT A. MINO, VICTOR H. MINO, and ROBERT G. LIVINGSTONE. *Am. J. Obst.*, 1948, 56: 325.

A case of primary melanoma (melanosarcoma) of the vagina in a 28 year old housewife is reported from the Protestant Deaconess Hospital, Evansville, Indiana. This patient was first seen in May, 1944, because of a persistent yellow vaginal discharge occasionally streaked with blood during the preceding 10 month period. Pain in the vagina and bleeding also followed coitus. Examination revealed a superficially ulcerated nonpigmented, rounded, flat tumor 2 cm. in diameter about 1.5 cm. within the vaginal introitus on the midpart of the left lateral wall. Removal of this growth was done and the pathologist reported a benign glandular tumor of the vagina.

Sixteen months later a recurrence was discovered just anterior to the operative scar. Excision of this tumor, followed by pathologic study, revealed the melanoma. Radical surgical treatment consisting of excision of the local growth, followed by vulvectomy and radical dissection of both groins was performed.

Seventeen previously recorded cases are also reviewed. Radiation was not used because of the poor results obtained in other cases.

Eighteen months after radical surgical therapy this patient is alive, healthy, and free of this disease. JOHN R. WOLFF, M.D.

MISCELLANEOUS

Dysfunctional Uterine Hemorrhage (Hemorragia uterina disfuncional). RODOLFO PECORONE. *Rev. méd. Rosario*, 1948, 38: 363.

The absolute frequency of dysfunctional uterine hemorrhage is difficult to evaluate since many patients are not hospitalized, but it is variously given as from 0.8 to 7 per cent. More than 50 per cent of the cases occur in the premenopause (40 to 50 years of age), 10 per cent in puberty and adolescence, and from 30 to 35 per cent during sexual life. The etiopathogenesis must be considered separately for the anovular or monophasic hemorrhage and for the ovular or biphasic hemorrhage. For the first, especially the hyperplastic variety, there is a rather clear and well established concept of the determining causes (hypophysis-ovary-endometrium complex), although the ultimate mechanism through which the hemorrhage is produced has not yet been cleared up. For the second, which has recently been described, the causes are still obscure. It may be stated that the first must be considered as an endometriopathy

of ovarian origin, either primary or secondary to hormonal changes (primarily antehypophyseal), in which the degree of sensitivity of the endometrium to the ovarian hormones also plays its part. This sensitivity depends upon whether the hemorrhage results from an atrophic or a frankly hyperplastic estrogenic endometrium.

In anovular hemorrhage the ovary presents sometimes a single large cystic follicle; the layer of granular cells is well preserved and in some cases there is a living ovule. More frequently there are numerous small follicular cysts. The corpus luteum is usually absent. In ovular hemorrhage the ovarian condition has practically not been evaluated, and it can only be stated that among 11 patients studied there were 2 in which the corpus luteum was reduced and the cells were loaded with fat.

The histopathology of the endometrium in dysfunctional uterine hemorrhage is particularly interesting. On the basis of extensive studies the endometrium has been classified into estrogenic or proliferative, progestational or secretory, and mixed. The statistics of 10 authors who reported on 922 cases show that the distribution of the three types was 74 per cent for the first, 22 per cent for the second, and 4 per cent for the third. The author's 31 personal cases give a similar proportion.

Age has a certain relationship to the incidence of the three types. Above 40 the estrogenic type, and, above all, the hyperplastic type, is very frequent; below 40 the progestational type is frequent. This was confirmed in the author's series. In puberty the hyperplastic type is common. There is also a certain relationship between the type of hemorrhage and the histologic type of the endometrium: metrorrhagia is more frequent in the estrogenic endometrium, while menorrhagia is usually associated with the progestational or mixed endometrium. Each of these basic types is subdivided into more or less important subtypes.

The histopathology of the endometrium is of great importance in the orientation and control of the hormonal treatment of dysfunctional uterine hemorrhage; it is especially important for the decision as to when the treatment should be stopped after a final curative effect is obtained, which is determined by the spontaneous production of an endometrium with a terminal secretory phase. For this purpose it is best to obtain endometrial material by curettage and aspiration. The study of vaginal smears provides additional data and, although in adolescents and virgins they cannot replace endometrial biopsy, they help in the orientation of treatment.

Only 5 fatalities from dysfunctional uterine hemorrhage have been reported: in the 2 patients who were studied histologically the endometrium was atrophic.

Despite the severity of the metrorrhagia and the presence of blood clots, the hemorrhage is nearly always painless. It is often preceded by periods of amenorrhea of from 5 to 8 weeks, giving rise to the clinical variety called the postabortive type. The menstrual history and a negative general examination, the absence of organic pelvic lesions or the presence of lesions which do not justify the hemorrhage, and the finding of secondary anemia suggest the diagnosis of dysfunctional uterine hemorrhage. Confirmation is provided by curettage and histopathologic examination of the material recovered. In some cases it will be necessary to take recourse to hysterosalpingoroentgenography. At present, hormone determinations are insufficient and give discordant results. Basal metabolism determination is useful.

Spontaneous cure is possible, especially in puberty or adolescence in which it occurs in from 30 to 80 per cent of the cases. During sexual life there is a possibility of spontaneous ovulation followed by pregnancy and definitive ulterior readjustment; in the premenopause there is a possibility of extinction of the ovarian function with final amenorrhea.

A table summarizing the therapeutic orientation advisable in accordance with the genital age of the patient is appended. RICHARD KEMEL, M.D.

Prolapse of the Vaginal Parietes and of the Uterus. Etiology, Pathogenesis, and Treatment, with the Report of Cases from the Obstetrical Clinic of the University of Turin (Il prolasso delle pareti vaginali e dell' utero. Eziologia, patogenesi e cura con contributo casistico dal materiale della Clinica Ostetrica dell' Univ. di Torino). TIMOTEO NOBILE. *Ginecologia*, Tor., 1948, 14: 49.

The occurrence of prolapse of the uterus in children and virgins is usually due to constitutional disorders, e.g., the case reported by Cappellani in which rachitis was the etiological factor. In older people this condition is found among women who have borne children, therefore the etiological factor must be found in the anatomical changes which are brought about by labor.

A meticulous anatomical description of the uterus and its adnexa is given, and it is believed that the pelvic diaphragm and the urogenital trigone are the important structures that support the uterus, the muscles being only secondary.

The author agrees with Gaspari and Morra that, during parturition, these structures hypertrophy and become hyperplastic and edematous. This softens and weakens the pelvic diaphragm, muscles, and perineal fascia and causes a diastasis of the levator ani muscle, 1 to 4 cm. in width. As a result of these changes, cicatricial adhesions with the surrounding tissues develop in the posterior wall and cause a shortening of the perineum with destruction of the superficial aponeurosis, almost total disappearance of the perineal fascia, and atrophy of the transversus muscle. Histological studies of these tissues in women with prolapse show regressive changes of the muscles, i.e., granular degeneration of the contractile substance, with partial or complete disappearance of the neurofibrillae and, at times, also fatty degeneration.

The author reports 48 cases which were followed for a period of 3 to 10 years. The ages of the patients varied between 26 and 68 years, and all had (1 to 10) children. In his endeavor to explain the presence of prolapse in young as well as older people, in uniparae as well as in multiparae, the author agrees with Delle Chiaie that the first clinical manifestation of the altered statics of the pelvic organs is to be found in the descent of the anterior vaginal wall, and along with it, of the bladder. Because of its proximity to the genital hiatus, the bladder will be found relaxed in all women who have borne children, the degree of relaxation depending on the number of children born, the presence of perineal lacerations, and the age of the patient. Concomitant with the relaxation of the bladder, there is a descent of the anterior vaginal wall first, and later, of the uterus which will stretch and ultimately destroy the tonicity of the uterine ligaments. From then on the uterus will continue its downward descent because of its own gravity.

Other factors leading to prolapse of the uterus are minute perineal lacerations not apparent at the time of delivery, a lacerated perineum not repaired, and if repaired, not well healed, and endoabdominal pressure on this locus minoris resistentiae caused by prolonged standing. When lacerations of the perineum are not the cause of the prolapse, constitutional muscular weakness must be considered as the etiological factor.

The mechanism of the prolapse is described by the author as follows: The abdominal viscera normally exert pressure on the posterior facies of the normally antiflexed uterus. Pressure on the uterine neck is counterbalanced by the round ligaments. The uterine body rests on the bladder, the vesicovaginal fascia, the pubococcygeal part of the levator ani primarily, and on the perineal muscles secondarily. Any unnatural strain which causes a contraction of the diaphragm, abdominal muscles, and pelvic diaphragm causes also a contraction of the pubococcygeus muscle. With the contraction of the latter there is a reduction in the fissure formed by the pelvic diaphragm. In the presence of perineal lacerations, there is a lack of support of the neck of the uterus, and the uterus assumes an intermedial or a retroflexed position. The intra-abdominal pressure is now exerted on the anterior uterine facies, and the neck of the uterus "threads," so to speak, the genital hiatus. Lack of support causes a pull on the ligaments which, in time, lose all resistance and lengthen. From then on the uterine descent becomes progressive unless the condition is corrected surgically. The author advocates the operation of Pestalozza which gives the best anatomical results, and does not alter the genital and sexual functions of the patient.

JOSEPH M. A. PAPE, M.D.

Gynecologic Surgery in the Elderly, with Special Reference to Risks and Results. FREDERIC D. ZEMAN and ARTHUR M. DAVIDS. *Am. J. Obst.*, 1948, 56: 440.

The increasing numbers of elderly women presenting a variety of gynecologic disorders bring new responsibilities to the gynecologist and to the internist.

This study of 202 cases of women over 60 years of age who were subjected to 217 surgical procedures with only 2 deaths indicates that the range of surgery may be extended for this age group.

Careful preoperative studies of these patients by the team of gynecologist and internist sharply limited the operative risk. These elderly women presented a variety of systemic conditions associated with the local lesions. The implications of hypertension, arteriosclerotic heart disease, anemia, diabetes, and malnutrition are discussed in relation to determination of the surgical risk.

Modern methods of anesthesia, the liberal use of whole blood transfusions, early rising, and the use of chemotherapy and antibiotics prevented or modified complications in the postoperative period.

Careful evaluation of the functional capacity of older individuals will eliminate false emphasis on chronological age and thus point the way to successful therapy.

JOHN R. WOLFF, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Pregnancy Test. CARLOS GALLI-MAININI. *J. Am. M. Ass.*, 1948, 138: 121.

The author's studies indicate that gonadotropic stimulation in the male batrachia has a direct effect on the testicle in which its targets are the interstitial cells, the spermatozoa, and the Sertoli cells. The presence of spermatozoa in the batrachian urine (migration to the bladder) is indirect proof that the injected substances have acted on the Sertoli cells. The reaction develops quickly; it is specific for some gonadotropins, and the response is slightly different when chorionic, serous or pituitary gonadotropins are injected. The Sertoli cells react quickly to gonadotropins.

The phenomenon of detachment and migration of the spermatozoa to the urinary bladder has a practical application in the diagnosis of human pregnancy. The presence of spermatozoa in a drop of toad's urine a few hours after the subcutaneous injection of 10 c.c. of urine from a pregnant woman indicates a positive result. Accumulated data in pregnancy tests in 2,661 cases showed correct results in from 98 to 100 per cent of the cases and an exact negative response in 100 per cent of 1,166 cases in which control tests were made with urine from nonpregnant subjects. This pregnancy test has the advantages of specificity, simplicity, speed of reaction, clear end point, and economy (the same toad can be used again after an interval of a week).

A modified technique of this test has proved to be useful for quantitative gonadotropic determinations.

ROBERT TURELL, M.D.

A Further Follow-Up Study of Eclampsia. LEON C. CHESLEY, WILLARD H. SOMERS, and FELIX H. VANN. *Am. J. Obst.*, 1948, 56: 409.

In the whole experience of the Margaret Hague Memorial Hospital, Jersey City, New Jersey, through 1945, there have been 245 cases of convulsive and 3 cases of nonconvulsive eclampsia, making an incidence of 0.3 per cent. The immediate maternal mortality was 10 per cent and the fetal loss 33 per cent.

All but 2 of the survivors were followed up for at least a year or until death. All but 8 were re-examined in 1946. In 1940, 141 of these patients were seen, and all but 5 of these were rechecked in 1946.

There were 12 late deaths, 6 of which were associated with cardiovascular renal conditions. The late annual death rate in the immediate survivors of eclampsia was 2¼ times the expected death rate.

The incidence of hypertension was 15 per cent. An additional 7 per cent of the patients had elevations of either the systolic or the diastolic pressures alone. There was no increase in the incidence of hypertension in a 6 year interval among the group checked in 1940 and rechecked in 1946.

The incidence of hypertension in the eclamptics of the last 6 years was found to be less than half of that in the earlier group. This reduced incidence may have resulted from a more radical management of pre-eclampsia.

In 226 pregnancies subsequent to eclampsia the recurrence rate of toxemia in the pregnancies carried to the period of viability was 34 per cent. The gross fetal loss was 20.3 per cent.

Although one cannot make a certain prognosis in individual patients, it is possible to assess the probability of recurrence of toxemia if one has certain data concerning the eclamptic pregnancy. The most significant factors bearing upon the prognosis are (1) the initial systolic blood pressure at the first visit and before the onset of toxemia; (2) the severity of hypertension; (3) the duration of the toxemia; (4) the time required postpartum for the blood pressure and urine to return to normal; and (5) the ratio of the patients' weight to his height.

JOHN R. WOLFF, M.D.

Heart Disease and Pregnancy. P. R. C. EVANS. *Guy's Hosp. Rep.*, Lond., 1948, 96: 194.

The author reviews and studies the case reports on pregnant patients suffering from heart disease who were admitted to Guy's Hospital, London, between 1938 and 1946. There were 90 patients representing 100 pregnancies. The patients were classified according to the New York Heart Association standards. The type of heart disease was divided into congenital, thyrotoxic, syphilitic, and rheumatic.

The article consists of a series of tables in which the author summarizes the study.

GEORGE B. BRADBURN, M.D.

Diabetes in Pregnancy. PAUL M. RIKE and ROBERT M. FAWCETT. *Am. J. Obst.*, 1948, 56: 484.

This study is presented to enumerate the complicating factors of diabetes in pregnancy as they occur at the Elizabeth Steel Magee Hospital, Pittsburgh, Pennsylvania. The report is based on a 10 year period, extending through June of 1946. Among a total of 31,544 deliveries there were 55 cases of diabetes complicating pregnancy. In one-fourth of the cases the diabetes was first discovered during the pregnancy. The average age of the pregnant diabetic patients was 8 years greater than the average age of all the pregnant patients at the hospital. There were twice as many white diabetic pregnant patients as negro.

Most of the pregnant patients with diabetes had excessive weight gain, probably due to water retention. One-third of these patients had some type of toxemia. One patient developed eclampsia. Sixty-one per cent of all these diabetics in whom the disease was recognized first during pregnancy had some degree of toxemia.

The average duration of pregnancy was less than full term, although in the majority of cases it was of over 8 months' duration. Two-thirds of the patients were delivered vaginally. The weight of the full-term infants was above normal. The weight of the 8-month infants approached the normal average weight of full-term infants.

The overall fetal mortality was 28.8 per cent. If all deaths up to the seventh month are excluded, the corrected mortality is lowered by 10 per cent. There were no fetal deaths among the deliveries by cesarean section. There were 2 maternal deaths, both of which occurred in toxic cases.

Diabetes alone is no indication for therapeutic abortion. All pregnant diabetics should be closely followed up by both the medical and obstetric services in order that the best form of treatment and the most suitable type of delivery can be chosen.

JOHN R. WOLFF, M.D.

The Necessity for Treatment of Pregnant Syphilitic Women During Every Pregnancy. MARY STEWART GOODWIN and MARY STREETER FARBER. *Am. J. Syph.*, 1948, 32: 409.

The authors report on 363 women with varying types of syphilitic infection, who previously had received metal chemotherapy. These women were observed through 570 subsequent pregnancies in which further antisyphilitic treatment was purposely omitted. Twenty-two women, all of whom were originally treated with penicillin for early syphilis, were observed through 26 subsequent pregnancies in which further antisyphilitic treatment was purposely omitted. Of the 596 infants born of these pregnancies during which the mothers were untreated, 549 (92 per cent) were born alive. Twenty of the 48 infants who were stillborn or miscarried were examined at autopsy. Evidence of syphilis in the fetus was found in none. Of the 549 infants born alive, 88 per cent have been carefully followed up for more than 2 months and more than 70 per cent for more than a year. All of the children followed up were normal and nonsyphilitic.

These data indicate that it is not necessary to administer antisyphilitic treatment to a syphilitic woman during every pregnancy, and that there is a high degree of probability that the infant will be normal if maternal treatment is withheld (a) regardless of the stage and duration of the syphilitic infection in the mother at the time of her original diagnosis and treatment and (b) regardless of the interval between the previous treatment and the pregnancy in which it is contemplated that further treatment be omitted. However, the mother should previously have received 4.0 gm. or more of arsphenamine (or its arsenical equivalent) together with concomitant bismuth, or 2.4 or more million units of penicillin (given for early syphilis, and this probably holds good for a maternal diagnosis of late latent syphilis as well); and this previous treatment should have been administered during a previous pregnancy or during a nonpregnant interval. Also, the mother should show no clinical signs of active syphilitic infection, and should be seronegative or, if still seropositive, should have a low titer only (1 to 8 dilution units).

Until further information accumulates, a syphilitic woman should be further treated in any pregnancy in which she herself shows clinical evidence of active syphilitic infection, or in which, in the absence of such clinical evidence, she herself has a positive serologic blood test for syphilis in a quantitative titer of 16 or more dilution units.

CHARLES BARON, M.D.

LABOR AND ITS COMPLICATIONS

The Practical Application of X-Ray Pelviography to Clinical Obstetrics. DAVID N. DANFORTH. *Q. Bull. Northwest. Univ. M. School*, 1948, 22: 223.

The author reviews the subject of x-ray pelviography to create a fuller appreciation of its purpose and possibilities on the one hand and on the other hand to discuss its limitations. The article is based on the work of Caldwell and Moloy, but it is not intended to ignore the work of Thoms, Mengert, Steele and Javert, Moir, and others.

He first discusses the pelvic variations which are of obstetrical importance. The Caldwell-Moloy classification clarifies these by pointing out the variations in the following pelvic features:

- Inlet shape
  - Width of the fore pelvis
  - Ratio of the widest transverse to the longest anteroposterior diameter
  - Ratio of the anterior sagittal to the posterior sagittal diameter
- Splay of the sidewalls
- Prominence of the spines
- Height of the symphysis
- Transverse diameter of the outlet
- Width of the subpubic arch
- Curvature and inclination of the sacrum

The four parent groups of Caldwell and Moloy are discussed and differentiated: namely, gynecoid, android, anthropoid, and flat, and it is pointed out that rarely is a true type of pelvis encountered, but rather that most of the pelves are mixed types which show not only variations in the pelvic type combinations but also considerable variation in size.

The author next discusses the roentgenographic demonstration of the important pelvic features, and points out that any technique which is truly satisfactory should demonstrate all of the above outlined pelvic features and their interrelationship. In addition, it would be ideal if it allowed measurement of the biparietal diameter of the head. The most satisfactory method for determining this latter measurement is by the Caldwell-Moloy method of viewing the stereoroentgenogram with the precision stereoscope. This instrument is not at present available. The method used by the author is a combination of those of Caldwell *et al.*, Thoms, and Steele and Javert. The essential films are as follows:

1. Standing lateral at 36 inches with a 10 cm. rod between the patient's buttocks.

2. The Thoms inlet view taken with the patient in the Thoms semirecumbent position.

3. A subpubic arch film with the patient supine and the tube directed at a 45 degree angle toward the symphysis as the target.

In addition, a flat film of the abdomen is valuable in determining fetal age and abnormalities.

The purpose and practical use of x-ray pelviography is to determine cephalopelvic disproportion and to prognosticate the mechanism of labor. Cephalopelvic disproportion cannot be determined unless the measurement of the fetal head can be taken. In the absence of a Moloy precision stereoscope, these measurements are impractical. An inexact but useful subterfuge is used by the author to determine inlet proportion. The "effective diameter of the inlet" is the diameter of the largest circle that would engage in the inlet. This diameter in primiparas should be 1.5 cm. larger than the biparietal diameter of the head. In an average sized baby, as determined by clinical examination, the biparietal diameter is from 8.5 to 9 cm.; therefore, the effective diameter of the inlet must be at least 10.5 cm. In multiparas the difference in diameter is usually 1 cm. instead of 1.5 cm.

The author discusses at length the prognostication of the mechanism and states that for practical purposes full utilization of available space in the pelvis must be made. To interpret the mechanism, one must regard two dicta as axiomatic: (1) the biparietal diameter is considered the narrowest diameter of the head, and (2) the occiput, generally, tends to rotate to the widest point of the pelvis. In this prognosticating, one must take into account the general shape of the inlet, the width of the fore pelvis, the ischial spine, the inclination of the sacrum, the nature of the subpubic arch, and the transverse diameter of the outlet.

The interpretation of these factors is important especially in delivering with forceps from the midpelvic position so that the narrowest fetal head diameter may be brought through the narrowest pelvic diameter. Some of the common mechanisms are reviewed, namely:

Positions: (a) occipitoanterior, midpelvic arrest; (b) occipitoposterior, midpelvic arrest; and (c) occipitotransverse, midpelvic arrest.

The author's excellent article is a timely review and in addition voices an unwritten plea for the more extensive and intelligent use of x-ray pelviography.

BYFORD F. HESKETT, M.D.

Pethidine in Labor. DONALD BEATON. *Edinburgh M. J.*, 1948, 55: 354.

The apparent effect of pethidine on uterine contractions is to decrease both frequency and intensity. This appeared to happen in 60 patients (66 per cent) but it could not have interfered with the function of the uterus since, in this series, labor was not prolonged. Pethidine does not appear to shorten labor. It has no serious ill effects on the mother or child, except that the incidence of postpartum hemorrhage appears to be increased.

The drug has been used with great advantage to the mothers, particularly those who were nervous and excited. There appears to be safety in large dosage, no matter when the drug is given in the first stage of labor.

CHARLES BARON, M.D.

Sulfadiazine and Penicillin Prophylaxis in Cesarean Section. R. GORDON DOUGLAS and ROBERT LANDESMAN. *Am. J. Obst.*, 1948, 56: 422.

The problems involved in the proper management of patients with prolonged labor constitute a major challenge to the obstetrician. Cesarean section appears in some instances to offer the best solution, but at times it has not been performed because of the probability of serious maternal morbidity. A study is in progress at the New York Lying-In Hospital, New York City, to determine the prophylactic value of the administration of sulfadiazine and penicillin in prolonged labor and other complications in which infection may be anticipated.

The results so far indicate that the combined prophylactic use of sulfadiazine and penicillin in cesarean sections has contributed to a reduction in the severity of intrauterine, wound, and peritoneal infections. With early prophylactic drug therapy, a longer trial of labor may be continued without danger. The control of infection by these agents broadens the safe employment of transperitoneal section and reduces the need for extraperitoneal section and cesarean hysterectomy. These drugs may be administered without serious toxic reactions during labor and the puerperium. Urinary tract infections associated with prolonged labor and cesarean section have been drastically reduced. The prophylactic therapy has decreased infantile mortality.

Penicillin and sulfadiazine may act together, increasing the total bacteriostatic activity against a single infecting agent; their effectiveness together covers a wide range of bacteria.

JOHN R. WOLFF, M.D.

A Short or Shortened Umbilical Cord as an Indication for Cesarean Section and Other Obstetrical Operations (Uber die durch zu kurze oder verkuerzte Nabelschnur bedingte Indikation zum Kaiserschnitt und zu anderen geburtshilflichen operationen). FRANZ KUEHBACHER. *Geburtsh. & Frauenh.*, 1948, 8: 372.

The author considers the problem of a short or shortened umbilical cord, or both, as an indication in itself for operative delivery. He admits the occurrence is a rare one.

Four cases are presented. All of the parturients had pelves smaller than normal. The infants weighed from 2,900 to 3,600 gm. In each instance but one, the cord was considered to be somewhat short (from 40 to 43 cm.) and was wrapped around the neck at least once. Two women were delivered by cesarean section, 1 woman by internal podalic

version and extraction, and the last by high forceps. There was no cephalic molding of the babies born by cesarean section. All 4 children were delivered alive.

The diagnosis is, of necessity, difficult. However, six signs are listed: (1) a funic souffle, (2) a "dent" in the uterine wall at the placental site, (3) irregular and severe labor pains, (4) arduous descent of the fetal head, (5) upward withdrawal of the head at the decrement of the uterine contraction, and (6) fetal heart sounds audible on the "rounded" rather than the "flattened" side of the uterus (when the cord is wrapped around the fetus because the back of the child is flattened against the placenta).

The author concludes that with nondescent of the head with or without evidence of fetal distress a cord of insufficient length to permit spontaneous delivery should be considered. Operative delivery is indicated when such a situation is strongly suspected.

WARREN R. LANG, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Histologic and Clinical Findings in Late Puerperal Bleeding (Histologische und klinische Befunde bei Spaetwochenbettsblutungen). HANS LIMBURG. *Geburtsh. & Frauenh.*, 1948, 8: 352.

Bleeding occurring late in the puerperium offers many possibilities as to etiology. Older textbooks mention retained placental tissue, decidua, or fetal membranes, and endometritis as the most frequent findings in this type of bleeding, but the author, after reviewing the writings of others and studying 90 cases of late puerperal bleeding observed in the Women's Clinic at the University in Hamburg, Eppendorf, does not find this to be true.

The author divides his patients into two groups: the first group consists of 41 patients treated in the period from 1922 to 1940, the second, of 49 patients treated in the period from 1940 to 1947.

In the first group macroscopic evidence of placental tissue was found only 4 times (9.8 per cent), and microscopic evidence of placental tissue in the form of a fibrinous polyp was found 5 times (12.2 per cent). Other findings were: retained decidua, hyalinization of the blood vessels, endometritis, fibrinous blood clots, irregular proliferation of the endometrium, endometrial hyperplasia, and irregular shedding of the endometrium from a defective corpus luteum. The latter three were considered of sufficient importance to be responsible for the bleeding in 13 instances (31.7 per cent).

In the second group placental tissue of sufficient size to be recognized grossly was obtained in 13 cases (27.7 per cent); in 11 cases (22.5 per cent) it was recognized microscopically. Other causes for bleeding were retained decidua and endometrial hyperplasia, the latter comprising 10.2 per cent. Bleeding from placental fragments occurred usually in the first 4 weeks postpartum.

With late puerperal bleeding, therefore, one must consider not only retention of the products of conception but also the endometrium itself which may be hyperplastic or incompletely formed in the proliferative or secretory phase from imperfect follicle or corpus luteum formation. Curettage with histologic examination of the material obtained is necessary to determine the exact cause for bleeding. Moreover, curettage has therapeutic value.

WARREN R. LANG, M.D.

NEWBORN

Postpartum Necrosis of the Pituitary. T. N. A. JEFFCOATE. *Irish J. M. Sc.*, 1948, Ser. 6: 256.

The author is in total agreement with Sheehan as regards the etiology and clinical features of postpartum necrosis of the anterior lobe of the pituitary gland. He also wishes to emphasize that patients with this syndrome, in contradistinction to Simmond's belief, do not show evidence of cachexia until the terminal stages of the process. He believes that Sheehan's estimate of the frequency of the syndrome is slightly high and that the disease is comparatively rare. The rest of the article is concerned with treatment, which is believed to be more difficult than diagnosis. At present the treatment consists of substitution therapy with gonadotropin, corticotropin, thyrotropin, desoxycorticosterone, estrogens and androgens.

Gonadotropins. The author has not had the opportunity of thoroughly testing the effect of follicle stimulating hormone and luteinizing hormone in this syndrome, but he believes that gonadotropin therapy offers more chance of restoring ovarian function in these cases than in any other type of ovarian failure or amenorrhea.

Corticotropin. In general the results are disappointing, but some patients claim they have a sense of improved well being.

Thyrotropin. Preparations of the drug are difficult to obtain and their potency is also doubtful. Thyrotropin has been used by itself with no effect.

Desoxycorticosterone has been used without producing any improvement. It is indicated only in cases with a significant electrolyte disturbance.

Estrogens. With adequate dosages pronounced effects are noted. The vulva, vagina, and uterus lose their senile characteristics and assume those of a woman in the active phase of her reproductive life. Intermittent therapy will produce estrogen withdrawal bleeding. The patients have more energy and gain weight.

Androgens. Testosterone has been used in large doses (100 mgm. per week for as long as 1 year) with excellent results. None of the patients manifested any sign of virilism despite the large doses. It produces growth of pubic and axillary hair and the patient's general health and energy are improved.

In conclusion, the author states that the ideal endocrine therapy for this syndrome is the administration of gonadotropin, thyrotropin, and corticotropin in combination, but it must be stated that testosterone in large doses is still the agent of choice in restoring the patient's well being and working effi-

ciency. The author also states that tissue transplants must be considered in therapy, but at the present time there has been little success with this procedure. The emergency treatment of a patient in crisis consists wholly of intravenous glucose therapy, but vitamins R and C, and a high protein and sodium diet are also indicated.

J. ROBERT WILLSON, M.D.

MISCELLANEOUS

Pregnancies after Untreated Sterility of Long Standing (Schwangerschaften nach langjaehriger, unbehandelter Kinderlosigkeit). KARL JULIUS ANSELMINO. *Geburtsh. & Frauenh,*. 1947, 7: 19.

The author discusses in detail a series of 30 cases in which gravidity occurred after many years of sterility without any treatment of either of the partners.

He stresses the psychogenic factors in the pathogenesis of functional sterility. Especially domestic conflicts with parents or in-laws, marital difficulties, fatigue and worry in business and professional life and financial trouble due to unemployment, seem to be causative factors.

When it was possible to straighten out these conditions, pregnancy occurred frequently without any treatment. WERNER M. SOLMITZ, M.D.

Demonstration of Lysozyme in the Amniotic Fluid, with Reference to the Bactericidal Power of the Amniotic Fluid (Dimostrazione del lisozima nel liquido amniotico. A proposito del potere battericida del liquido amniotico). G. VECCHIETTI. *Quad. clin. ostet. gin.*, 1948, 3: 233.

The majority of authors have denied the existence of a lysozyme in the amniotic fluid. Vecchietti extracted amniotic fluid by transabdominal puncture from the amniotic sac in 10 pregnant women and tested these samples by the usual method of graduated dilutions for the usual test organism (Micrococcus lysodeikticus), which is, of course, highly lysozyme-sensitive. Concurrent identical tests were run against the subject's blood serum.

By this method the author finds that lysozyme is present in the amniotic fluid of normal healthy women in the ninth month of pregnancy, about one-fourth the amount present in the same subject's blood serum. It is believed that the bactericidal action of the amniotic fluid explains why the amniotic cavity so seldom becomes contaminated from the blood stream, of the mother who has bacteria in her blood stream and why infection does not develop intra-amniotically in every case in which the sac has been ruptured.

It is assumed that this bactericidal power of the amniotic fluid also extends to other bacteria, many of them pathogenic. JOHN W. BRENNAN, M.D.

Obstetrical Evaluation of the Pubic Arch. W. I. C. MORRIS. *Lancet*, Lond., 1948, 2: 139.

The author presents a clinical method of estimating the availability of the pubic arch for obstetrical delivery. A circular metal disc 8 cm. in diameter is used as the measuring device. A metal strip with a centimeter scale is attached to the perimeter of this circle. Measurements are made with the patient in the lateral prone position with one leg drawn up. The disc is pressed between the ischial tuberosities so that the pubic margin fits snugly. The distance between the margin of the disc and the under surface of the pubic arch is measured in centimeters.

The author interprets any distance greater than 1 cm. as an indication of narrowing of the arch. He suggests that the method is almost as accurate as roentgenological measurement; however, when narrowing is indicated, further study by means of the x-rays is indicated. The method is apparently more accurate than many others in estimating the angle of the arch, and certainly serves to emphasize the importance of knowing the type of outlet with which one has to deal during delivery.

GEORGE B. BRADBURN, M.D.

Microscopic Observations of the Placental Barrier in Transplacental Erythrocytotoxic Anemia (Erythroblastosis Fetalis) and in Normal Pregnancy. B. S. KLINE. *Am. J. Obst.*, 1948, 56: 226.

Microscopic examination of the placentas in 15 cases of erythroblastosis fetalis showed numerous breaks in the barrier associated with hemorrhage from the fetal circulation into the maternal intervillous spaces. In areas of very recent hemorrhage nucleated red blood cells of the fetus were observed in the regional intervillous spaces. Regional to the areas of vascular occlusion, the overlying epithelium showed degenerative or necrotic change, and in places there was erosion associated with hemorrhage from the fetal circulation into the regional intervillous spaces. Coincidentally, access of the maternal blood to the fetal circulation was afforded.

Microscopic examination of the placentas in the last half of normal pregnancy showed numerous breaks in the barrier of the same type as observed in the cases of erythroblastosis fetalis.

Since it is now known that the erythroblastosis in the disease is a secondary manifestation, the designation "erythroblastosis fetalis" is no longer justified. Furthermore, it has been found that destruction of the incompatible fetal red blood cells in the disease occurs in part by phagocytosis. The term "congenital hemolytic anemia," therefore, is not entirely accurate and "transplacental erythrocytotoxic anemia" is suggested as a better name for the disease.

JOHN R. WOLFF, M.D.

Contribution to the Study of Ectopic Chorioepithelioma. Chorioepithelioma Situated in the Liver (Contributo allo studio dei corionepiteliomi ectopici. Corionepitelioma a sede epatica). ARMANDO FASANOTTI. *Arch. ostet. gin.*, 1947, 52: 340.

One of the most interesting aspects of the study of chorioepithelioma is that which deals with the ectopic localization of the tumor.

The study of these localizations, which may involve various organs without even involving the uterus or uterine tubes, broadens our knowledge of the problems concerning the nature and the pathogenesis of chorioepithelioma. This particular tumor loses its restricted significance as a tumor of one organ, the uterus, and acquires the more extensive significance of a tumor that might involve widely separated organs.

These tumors occur most frequently in connection with the pregnant state, completed or interrupted, recent or remote, although they may occur independent of the pregnant state as in case of chorioepithelioma of teratogenous origin.

The most common sites of the ectopic localizations of chorioepithelioma are the uterus, vagina, intestine, lung, bladder, broad ligament, and rectovaginal wall. A comparatively rare ectopic localization is the liver. The author could collect only 5 such cases in the literature, and to these he adds a sixth case which came under his observation, giving the complete clinical record of the patient, and autopsy findings.

The case reported occurred in a married woman 37 years of age, who had always been healthy until 5 months before entry into the hospital. Following the delivery of her second child, which was spontaneous and normal in every way, she had experienced intermittent low grade fever with chilly sensations. The fever was accompanied by a severe type of continuous pain in the right hypochondrium, the pain radiating to the back and the right shoulder and becoming accentuated when the patient lay on her right side. She developed anorexia and general weakness, both of which gradually increased in severity. She entered the hospital in a moribund condition and during the 24 hours prior to her death, she ran an undulating type of fever and developed severe pain in all parts of her abdomen. She vomited several times and was very dyspneic until death.

Physical examination revealed a moribund patient with signs of right pleurisy. Her abdomen presented a large tumor, firm in character and extending from the right hypochrondrium to the right iliac crest. The tumor proved to be painful on palpation.

Autopsy revealed a right fibrinous pleurisy. The abdominal cavity contained an abundance of bloody fluid. The liver was noticeably enlarged and weighed 4,110 gm. It extended downward and transversely to the umbilicus. The right lobe of the liver presented a reddish tumor mass the size of a large apple. The surface of the tumor appeared nodular and irregular. The consistency of the tumor was less firm than that of the surrounding liver tissue. The tumor margins were ill defined; the capsule was perforated in several places. Grossly, on section, the tumor presented a nodular formation with the appearance of a bloody sponge, the size of the nodules ranging from the size of a chick-pea to that of a hazelnut.

The uterus was of normal appearance and consistency, but was slightly enlarged. The mucosa was swollen and grayish-white in color. The cavity contained a whitish fluid. The body of the uterus and the vagina were normal. Both ovaries contained multilocular cysts. The right kidney contained a calculus.

The anatomopathological diagnosis was that of hemoperitoneum from rupture of a primary tumor of the liver, cardiac decompensation, right fibrinous pleurisy, right renal calculus, and cystic degeneration of both ovaries.

Histological section of the liver showed the tumor nodules to consist of a central and a peripheral zone. The central zone was composed of layers of fibrin, in which there were red blood cells, some of which were of normal appearance and others in various stages of degeneration. Passing from the central zone to the periphery were characteristic neoplastic cells, some in groups and some isolated. These cells were of two types. One type was in the shape of irregularly polygonal cells with clear cytoplasm and small basic-staining, oval nuclei. These cells tended to form a membrane. The other type of cells were syncytial cells presenting numerous stages of fission characteristic of tumor cells. The cell protoplasm was granulated and vacuolated and intensely basophilic. These cells had no characteristics which revealed their origin.

Histological section of the ovaries showed the picture of true corpus luteum cysts.

Histological section of the uterus showed a typical decidual reaction, but there were no tumor cells present. Sections of the uterine tubes were normal.

Failure to find evidence of a primary tumor in the uterus, ovaries, and tubes shows that the chorioepithelioma of the liver in this case was not metastatic.

There is no structural evidence in the tumor to show that it was of teratogenous origin.

The author believes that this chorioepithelioma of the liver developed from the trophoblastic elements which were progressively dispersed from the decidual uterus. Invading the vessels of the myometrium, these cells passed along through the pulmonary circulation without invading the lungs and came finally to lie in the liver where they developed into the tumor mass. During normal placentation, elements of ectodermal origin infiltrate the peripheral myometrium. During decidual reactions in the uterus, emboli of trophoblastic elements have been demonstrated in the maternal lungs and liver. In this case the pathological symptoms referable to the liver developed following delivery and progressed rapidly to a fatal termination within 5 months.

BLACKWELL MARKHAM, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY AND URETER

Urokymography (Uroquimografia). ENRIQUE PEREZ CASTRO. *Arch. espan. urol.*, 1948, 4: 275.

This is a treatise on the many advantages of urokymography, which Castro believes is more valuable than pyelographic studies, serial roentgenography, and roentgenographic moving pictures.

Kymography has been applied to cardiac studies and it is thought its advantages here equal those of the electrocardiograph. It is a field little explored at present.

The recording of a moving body in the urogenital system is of inestimable value, and urokymography permits not only this but gives a detailed study of kidney dynamics, particularly of pelvic peristalsis, and the normal and abnormal functioning of the calices and ureters. Not only are accessory ureters with or without double kidneys observed, but the functioning of each unit can be determined.

The article has many contrasting illustrations pointing out the advantages of each method of objective study. STEPHEN A. ZIEMAN, M.D.

Experimental Contribution to the Study of the Behavior of the Renal Lymphatic System Following Partial, Subtotal, or Total Block of the Lymph Flow and Its Significance in the Pathogenesis of Renal Infections (Contributo sperimentale allo studio del comportamento del sistema linfatico renale in seguito a blocchi parziali, subtotali e totali della corrente linfatica e suo significato nella patogenesi delle infezioni renali). VITTORIO STAUDACHER-DALLE ASTE and BRUNO AMISTANI. *Arch. ital. urol.*, 1947, 22: 236.

An experimental study on dogs was undertaken by the authors to investigate the possibility of a renal infection through ascending or descending lymphatic paths. The experiments were performed on 12 dogs under general anesthesia. A suspension of Prussian Blue in turpentine oil was used for the injection of the lymphatics. The experiments were divided into 2 groups: (1) injections into the vesical and ureteral lymph reticulum, collecting vessels, and external, internal, and common iliac lymph nodes; and (2) similar injections after the preceding creation of a partial or complete block by means of an occlusion of one lymph vessel, ligation of one or a few afferent lymph vessels, or ligation of all lymph vessels leading to the cisterna chyli.

The experiments showed that no connection exists between the intramural lymph reticulum of the ureter and the corresponding renal parenchyma. There are communications between the collecting vessels of the upper segment of the ureter and the kidney, but, no matter whether normal physiologic conditions prevail or a stasis is provoked, the lymph maintains a centrifugal direction. In spite of a partial, subtotal, or total block, the lymph flowing from the kidney maintains strictly the centrifugal direction.

It follows that the propagation of pathogenic bacteria toward the kidney by the retrograde route from remote foci of infection is unconceivable. An inversion of the lymph flow required for contamination of the kidney through the lymphatic paths can be created experimentally only under exceptional conditions, which cannot be duplicated in human pathology. JOSEPH K. NARAT, M.D.

The Pathogenesis of Serous Cysts of the Kidney, with a Personal Observation (Sulla patogenesi delle cisti sierose del rene, con una osservazione personale). P. RIGATTIERI. *Arch. ital. urol.*, 1947, 22: 157.

A 55 year old mother of 8 children, who had also had two spontaneous abortions, had been suffering from frequency of urination for about a year. About 3 months previously she had begun to suffer with cramplike pains and a sense of heaviness in the left lower part of the abdomen. The examination, including a roentgenogram, uncovered the usual findings of a large growth on the left kidney. Nephrectomy brought to light a fetally lobulated left kidney with a serous cyst (size of a child's head) attached rather extensively to its free lateral border, and another cyst (size of a hazelnut) protruding halfway above the surface on the anterior aspect of the lower pole. When the kidney was sectioned a still smaller cyst was found just beneath and contiguous to the partially protruding cystic formation.

Histologic examination of all these cavities containing serous fluid disclosed the typical double-stratum structure with areas of the inner wall still clothed by endotheliumlike cells. The contents of these cysts was a clear, lemon-colored liquid, of neutral reaction and with traces of albumin, phosphates, and sulphates, but no urea.

The author believes that these cysts were congenital and to be explained on a dysembryoplastic basis (Ruckert, Kampmeier). JOHN W. BRENNAN, M.D.

Bilharzial Affection of the Ureter. MICHAEL GELFAND. *Brit. M. J.*, 1948, 1: 1228.

The ureter is often affected in urinary bilharziasis. Therefore, the purpose of this article is to report on the various lesions found in the ureter in a series of 110 consecutive autopsies on Africans held at the Salisbury Mortuary, Southern Rhodesia.

The literature would appear to stress the obstructive lesions encountered in urinary schistosomiasis. As early as 1919 Fairley drew attention to the tendency of the disease to invade the lower portion of the ureter. He reported that catheterization of such a ureter may reveal a hydronephrosis that has not shown any clinical manifestations. He is one of the early workers to refer to the golf-hole appearance

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of the ureteric orifice, which he not infrequently found involved even in early cases. In another publication Fairley (1919) drew attention to the obstruction occurring in a bilharzial ureter, but he also recognized the possibility of a hydronephrosis resulting from obstruction in the bladder wall itself. In his experimental work on infected monkeys he found that the lumen of the lower third of the ureter may show dilatation and the wall considerable thickening. The dilatation results from obstruction due to thickening from the cellular infiltration of the wall in the neighborhood of deposited ova.

Aly Bey Ibrahim (1923) published from Egypt an important article on bilharziasis of the ureter. In it he refers to the very serious complication of stricture of the ureter. Dew (1923) of Egypt infers that the ureter becomes narrowed because of fibrosis and calcification, contraction ensuing fairly early in the disease. Hydronephrosis as a result is common. Also from Egypt, Hutchison (1928) refers to an ascending pyelitis and hydronephrosis resulting from stasis of the urine, occurring because of obstruction at the lower end of the ureter. Campbell-Begg (1944), writing on schistosomiasis in South Africa, refers to the occurrence of a tight fibrous stricture of the ureter which is found only in the minority of cases. Kirkaldy-Willis (1946), working in East Africa, mentions the possibility of obstruction in the lower ends of the ureters.

The examinations reveal certain interesting points, and if corroborated by others might cause the present day treatment of bilharzial ureteric disease to be reviewed.

While stricture or stenosis of the ureter is encountered at autopsy, this finding is very much less common than the author originally expected. He reported a series of 100 consecutive autopsies in patients affected by vesical bilharziasis and found only one stricture but many dilated ureters. In 1 of the 3 cases showing stenosis in this second series hydronephrosis was present. The author does not state that stricture or stenosis is not serious and does not occur in practice, nor that cases of hydronephrosis due to it are not found. However, such cases are comparatively rare.

Dilatation of the ureter by the disease is far more common than stenosis or stricture. Such dilatation is usually associated with thickening of the wall of the ureter, which also becomes elongated and tortuous. This effect is usually well demonstrated roentgenologically. The functions of such a ureter will become impaired, peristalsis will be diminished or lost, and, hence, urine would not be properly propelled toward the bladder. As a result, stasis will follow, and with it some degree of hydronephrosis. This may not be the only explanation of hydronephrosis in cases showing only dilatation of the ureters. Another possible explanation for some of these cases may be a reflux of urine up an incompetent ureteric orifice during micturition, when the bladder actively contracts. Because of the dilatation produced by the disease the sphincteric function of the intravesical portion of the ureter is lost or impaired. The hydronephrosis due to such loss of sphincteric function probably explains some of the cases of hydronephrosis seen in prostatic disease (Hughes, 1946).

When the ureter dilates it also lengthens and "unfolds" itself. This "unfolding" may cause the ureter in the particular portion affected to assume an S-shaped curve or bend, thus simulating stricture. This was seen in one of the 25 cases reported with dilatations of the ureter. The right ureteric orifice protruded about 2 mm. beyond the bladder mucosa. The orifice itself was dilated (6 mm.). The tube could be passed neither from below nor from above, and a stricture was held to be responsible for this. However, on opening the ureter the intravesical portion was dilated because of disease, its circumference being 11 mm. as compared with 8 mm. on the opposite side. The intravesical portion of the ureter had elongated and hence its orifice protruded beyond the bladder mucosa; the rest of it had become "folded," so to speak, upon itself, causing an obstruction.

Recently, Barlow, of the Southern Rhodesia Government Medical Service, was able to demonstrate such a reflux in one ward case. The patient, an African male, passed ova of *Schistosoma* haematobium in his urine, and an intravenous pyelogram revealed a well marked dilatation of the lower end of the right ureter. Barlow filled the bladder with "uropac" and then instructed the patient to empty his bladder. An x-ray film taken before and after micturition revealed that some of the dye had passed up the ureter from the bladder. There was no evidence of a hydronephrosis on the affected side.

A series of 110 consecutive autopies were performed on African adults found to have bilharzial disease of the bladder.

In 25 cases the ureters were dilated by the disease.

Stenosis or stricture of the ureter was found in 3 cases.

Hydronephrosis was found in 3 cases showing dilatation of the ureters, and in one of the cases affected by stenosis of the ureter.

Possible explanations for the hydronephrosis in the presence of dilated ureters are advanced.

JOHN E. KIRKPATRICK, M.D.

Ureterocutaneous Transplantation. GEZA SCHINAGEL and GEORGE SEWELL. *J. Urol.*, Balt., 1948, 60: 586.

A method of ureterocutaneous transplantation is presented whereby a tubed pedicle is prepared, to enable the terminal segment of the ureter to protrude from the skin and yet remain viable.

Through an oblique skin incision near McBurney's point the muscles are split and the ureter is divided and brought to the surface. A catheter is placed in the ureter, and the wound is closed up to the skin. One of three methods is used in applying skin pedicles. If the abdominal wall is loose, as it is likely to be in thin patients, quadrangular skin pedicles are used. Silk is used to close the tube and a steel wire suture is used at the base.

The mucosa at the mouth of the ureter is sutured to the skin. If the patient is obese and the skin is taut, longitudinal skin pedicles are made bilaterally with parallel incisions.

A third method is to wrap a single, longitudinal skin pedicle corkscrew like, to form the tube. Following operation, the ureteral catheter is fixed in a vertical position with a wire frame.

The procedure described was devised in an attempt to avoid the use of a permanent catheter in the ureter, to facilitate gravity drainage of the urine, and to avoid stricture formation.

JOSEPH E. MAURER, M.D.

BLADDER, URETHRA, AND PENIS

Vesical Dysfunction in Paraplegia. HERBERT S. TALBOT. *J. Urol.*, Balt., 1948, 59: 1130.

The major urologic problems encountered in the care of patients with spinal cord injuries arise, either directly or indirectly, from interference with the normal innervation of the bladder. A prominent exception is the tendency toward urinary lithiasis which is frequently exhibited by patients undergoing long periods of muscular inactivity for any reason; but even this is, in these cases, notably enhanced by the stagnation and infection resulting from the vesical dysfunction. It is, of course, well known that vesical function which is normal, or clinically indistinguishable from normal, is restored spontaneously in a significant proportion of cases of spinal cord injury, even though paralysis of the extremities may remain. It is probably true, as well, that if genuine recovery of bladder function is to occur, it will occur relatively early, perhaps as soon as spinal shock has passed. However, spinal shock is itself a phenomenon of variable duration. Sensory and motor return in the extremities is seen 18 months or more after injury, and although visceral return may not be anticipated after so long an interval, it is difficult to find logical justification for establishing an arbitrary time limit beyond which no prospect remains but permanent suprapubic drainage.

The bladder is a reflex organ upon which has been superimposed a number of controls exerted by the higher nervous centers, which are largely inhibitory in character, with probably an added factor of coordination. The normal bladder manifests a striking capacity to adapt its configuration to changes in the volume of its contents. Detrusor contraction is stimulated by stretch only, and is associated with a reciprocal opening of the internal orifice which is independent of central nervous control. Inhibition of micturition is a direct mechanism; facilitation is indirect and is effected by withdrawal of inhibitory barriers to reflex contraction.

The reflex centers for vesical function are located in the second, third, and fourth sacral segments of the spinal cord. The efferent supply to the detrusor muscle passes through parasympathetic pathways. Interruption of the sympathetic nerves has no effect upon micturition. The afferent fibers pass through

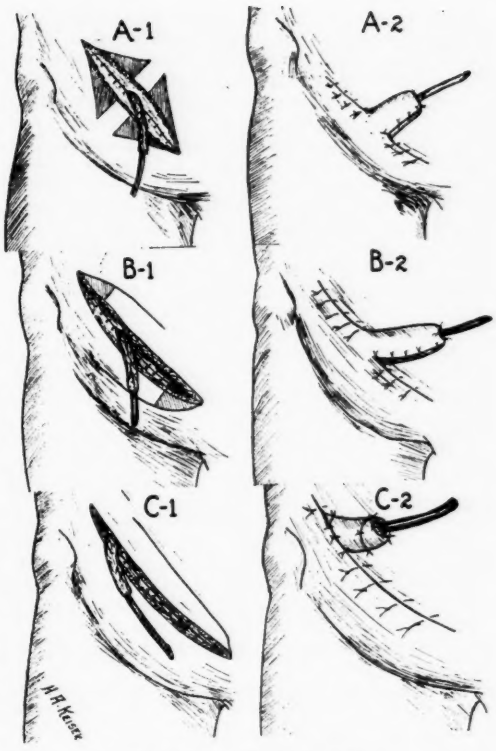

Fig. 1 (Schinagel and Sewell).

both parasympathetic and sympathetic channels, some of those in the latter entering the cord as high as the ninth dorsal segment.

Cystometry provides a valuable means for the study of the normal or pathological physiology of the bladder.

The treatment of neurogenic vesical dysfunction after spinal cord injury should not be considered as completed when reflex involuntary voiding has been established. A program of rehabilitation is suggested which, in a considerable number of cases, will result in urethral voiding, little or no residual urine, a useful bladder capacity, and a reasonable degree of voluntary control. The methods employed include closure of urinary fistulas, tidal drainage, training of the patient to initiate voiding at suitable intervals, and transurethral resection in suitable cases.

JOHN E. KIRKPATRICK, M.D.

Plesioroentgenotherapy of Bladder Tumors (La plesioroentgenterapia dei tumori vescicali). PASQUALE BRUNI. *Urologia*, 1948, 15: 207.

The technique of plesioroentgenotherapy used by the author consists of suprapubic opening of the

bladder and exposure of its cavity by the use of Legueu's retractor. The tumor is lifted with Marion's forceps for vesical tumors and cut with the electric knife at its base. A field-limiting portal, sterilized by boiling, and having a diameter of 25 mm. and a surface of 500 sq. mm., is applied to the cut base of the tumor and kept in place by a forceps, and the extremity of the roentgen tube covered by a sterile rubber finger cot is introduced into the portal. If the portal is too small to cover the entire tumor base, two or more fields are used successively. The factors for irradiation are: distance, 2 cm.; filter, 0.2 mm. of aluminum; kilovolts, 50; surface dose, 8,000 roentgens per minute. After irradiation, the bladder is closed on a Pezzer sound and the abdominal wall reconstructed. Following an adequate period of observation, the sound is removed and the opening allowed to close. Cystoscopic control and eventual biopsies are instituted methodically during the postoperative period and subsequently.

Bruni has treated 8 cases in this manner, 2 of which have already been reported in 1942. The ages of the patients ranged from 45 to 63 years. The histologic diagnosis was papilloma in an advanced stage of cancerous degeneration in 2 cases, and various types of carcinoma in the 6 other cases. The total doses given ranged from 16,000 to 48,000 roentgens, and the number of fields used, from one to six. The dose given to each field was 8,000 roentgens except in 2 cases in which 16,000 roentgens were used. No immediate or late, or local or general disturbance was observed.

Immediate cure was obtained in all patients except one who died on the third postoperative day from cardiocirculatory insufficiency. Permanent cure must be accepted for the 2 patients who were operated upon 7.5 and 6.5 years ago, respectively. Local recurrence was observed in 2 patients, 24 and 22 months postoperatively. One patient died from acute intercurrent disease 3 months after immediate cure. Two patients were treated too recently (12 and 6 months ago) to allow speaking of permanent results. It would thus seem that the method deserves further trial because its innocuity must be considered as established. This will allow improvement of the technique and determining the indications on a more secure basis. In the meantime, the method should not be used when complete surgical removal of the tumor is possible without complete removal of the bladder; it may be used when it will allow a more economical intervention, as in one of the present cases in which the tumor involved a ureteral orifice and irradiation made ureteral reimplantation unnecessary, with immediate and late favorable results. The method should be considered in cases in which the site or extension of the tumor makes partial cystectomy impossible and total cystectomy necessary, and also in cases in which the spread of the tumor, the general condition of the patient and the presence of metastases do not allow total cystectomy and make recourse to symptomatic treatment imperative. RICHARD KEMEL, M.D.

GENITAL ORGANS

Retropubic Prostatectomy. GEORGE AUSTEN, JR., AND WILLIAM C. QUINBY. *N. England J. M.*, 1948, 239: 35.

Until recently, three principal operative approaches to the prostate had been accepted as satisfactory: perineal prostatectomy, suprapubic transvesical prostatectomy, and transurethral prostatectomy. No one of these procedures alone is applicable for the treatment of every type of prostatic obstruction. In spite of the contention of surgeons who are strong proponents of one method to the exclusion of the others, it seems fair to say that each of these procedures has certain indications and contraindications, as well as certain limitations and disadvantages, and that each is attended by various technical difficulties that may render the results of operation unsatisfactory. Therefore, when a new and logical method of treatment is proposed, which apparently produces good results in intelligent hands, the progressive surgeon must examine it carefully.

In 1945 Millin of London presented his initial report of "a new extravesical technique" of prostatectomy, a suprapubic operation for nonmaligant lesions of the prostate to which he applied the name "retropubic prostatectomy." Although Millin considered his operation original, he noted that a somewhat similar suprapubic extravesical approach to the prostate had been made and reported by others. He referred to the reports of Van Stockum in 1909 and of Jacobs and Casper in 1933.

In his initial publication Millin reported the results obtained in 20 patients with benign prostatic disease who were operated upon by this method; 13 of the patients had generalized hypertrophy, 2 had fibrous glands with a sclerotic bladder neck, 1 had calculous disease, 2 had pure lateral-lobe hypertrophy, 1 had generalized hypertrophy associated with a prostatic abscess, and 1 had postprostatectomy scarring of the prostatic urethra. There were no postoperative deaths, and complications were few. There were 2 cases of minor delayed bleeding, both in patients who had had grossly infected bladders before operation, which was easily controlled by the use of an inlying catheter for 48 hours. No cases of immediate hemorrhage, gross infection, pyelonephritis, or renal failure were encountered. A femoral vein thrombosis developed in 1 case, and an abscess of the testis in another. In only 3 cases was there suprapubic leakage of urine after removal of the urethral catheter on the sixth or seventh postoperative day, and in these cases it was felt that this occurrence was the result of initial faulty adjustment of the catheter. Concerning the long term follow-up results, Millin believed that it was too early to pass a verdict on the incidence of postprostatectomy obstruction, but subsequent reports from his clinic have shown that postoperative contracture of the vesical neck occurs occasionally. For that reason he has made a modification in his original technique, which is described.

In summarizing the features of the retropubic operation the authors believe that the Millin technique is particularly suited for treatment of the following types of prostatic disease: benign hypertrophy of the lateral lobes or of the lateral lobes and the median lobe combined; benign hypertrophy of the median or subtrigonal lobes when intravesical extension is not marked; and calculous disease of the prostate, particularly when associated with benign hypertrophy. With increasing experience and future developments in technique, this approach may also prove to be a good method of performing plastic procedures in the prostatic urethra and at the bladder outlet.

At present the Millin operation is not indicated for the treatment of patients with obstruction due to sclerosis of the vesical outlet and prostatic fibrosis. In such cases transurethral resection is the preferred procedure. In cases of prostatic obstruction associated with disease of the bladder in which surgical therapy of both lesions is required transurethral resection is preferred also. In this category may be grouped patients with prostatic obstruction who also have a vesical tumor, large vesical calculi, a poorly draining diverticulum with or without tumor, and any other vesical lesion necessitating surgery. And, finally, for the reasons mentioned before, it is believed that the retropubic operation is not suited to the treatment of early carcinoma of the prostate.

The pertinent literature concerning a newly proposed method of retropubic prostatectomy is briefly reviewed, and the advantages and disadvantages of the procedure are discussed.

The indications and contraindications for the employment of this operative approach are presented in the light of a limited experience with the operation.

The technique of the operation is outlined, and a summary of the results obtained in a selected group of 20 cases is recorded.

JOHN E. KIRKPATRICK, M.D.

Estrogenic Hormone Therapy of Prostatic Carcinoma (Ormonoterapia estrogena del carcinoma prostatico). PASQUALE BRUNI. *Gior. ital. chir.*, 1948, 4: 296.

In 20 cases of prostatic carcinoma observed at the Surgical Clinic of the University of Naples, the ages of the patients ranged from 52 to 76 years, and the disease had been present from a few weeks to 9 years; 13 cases were primary carcinomas and 7 were degenerated adenomas. Bone metastasis was roentgenologically demonstrated in 4 cases. Epicystostomy was performed in 8 cases and roentgentherapy in 3. Sixteen patients were subjected to active hormone treatment orally or parenterally, and 4 to castration alone. The doses of estrogen ranged from 2 to 15 mgm. per day. The best method is to start with an attack dose of from 8 to 15 mgm. daily and to pass to a maintenance dose of from 3 to 5 mgm. daily. The duration of treatment to date has varied from 31 months to 15 days. In 2 cases suspension of treatment was followed by rapid aggravation, but resumption of treatment allowed the patients to regain what they had lost. In one case the treatment caused attacks of bladder tenesmus which induced the patient to suspend treatment several times; the result of the treatment was negative during the 18 months it was applied.

The results of treatment were favorable in 14 patients (70 per cent), negative in 3 (15 per cent), and unknown in 3. Late results can be considered only in cases in which the hormone treatment has been administered for at least 12 months. Of 6 patients fulfilling this condition, one obtained no benefit but in 5 there was marked improvement. One of these died of extraneous disease after 12 months, another died of uremia and urosepticemia after 22 months, and a third died of gradual cachexia despite 30 months of successful treatment. The last 2 are in good condition after 31 and 20 months, respectively.

Castration performed in 4 patients without associated stilbestrol therapy dates back 6, 5, 3, and 2 months, respectively. Although it is impossible to speak of late results, its favorable results in 100 per cent of the cases stand out against the favorable results in only 62.5 per cent, the negative results in 18.7 per cent, and the unknown results in 18.7 per cent as obtained with hormone therapy. In addition, it is to be noted that the systematic favorable results of castration were early and conspicuous, while those of hormone therapy were not so constant, so imposing, nor so early.

From the point of view of the results obtained with hormone therapy, there was no observable difference in behavior between cases of primary cancer and cases of degenerated adenoma.

RICHARD KEMEL, M.D.

MISCELLANEOUS

Transperitoneal Dialysis. RONALD W. REID. *Proc. R. Soc. M.*, Lond., 1948, 41: 413.

The accumulation of toxic metabolites, alterations in the osmotic pressure of body fluids, dehydration, excessive hydration, electrolyte imbalance, and acid base alterations are a few of the many factors involved in producing the clinical entity called uremia.

The composition of the body fluids is estimated to be: vascular, 3 liters; interstitial fluids, 11 liters; and intracellular, 35 liters, for a 150 pound man. These various factors account for about three-quarters of the body weight. Interchange between these three types constantly occurs. Potassium and phosphorus are the ions concerned in the composition of the intracellular fluid. Apparently the cell membrane, in contrast to that of the capillary, is impervious to most electrolytes.

The relationship of the kidney to the fluid in the vascular system and the remainder of the extracellular fluid is shown by an illustration. It is apparent that the function of the kidney is to maintain the physical and chemical constancy of the body fluids and to eliminate waste products. On decreased renal function resulting from disease, de-

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hydration, or lack of salt or other essential factors for proper function, change in the body fluids occurs and waste products accumulate. While the exact nature of the change remains in doubt, it is known that urea and phenols increase in the blood stream when renal insufficiency exists. While urea, even in high concentrations, is not toxic, the determination of the urea blood level serves as an index to the severity of the uremia. The basic concept of the treatment of uremia by dialysis is that the physical and chemical composition of the extracellular fluids, excluding proteins, can be influenced by contact across a semipermeable membrane, whether by means of an artificial kidney or by peritoneal lavage.

The contact with the extracellular fluids achieved by means of the artificial kidney, is illustrated.

Four principles are considered to be involved in the treatment of uremia: (1) where possible, remove the cause; (2) reduce the kidney load; (3) substitute renal function by artificial means; and (4) relieve symptoms without prejudicing recovery.

A thorough urological survey should be carried out. Protein breakdown should be reduced to decrease the amount of metabolic products to be excreted. Carbohydrates should be substituted for protein. Fluids or diuretics should be avoided since water and urea usually exist in sufficient amounts. Existing anemia should be corrected. Six cases are presented in detail. The first patient received an incompatible blood transfusion treated with vast quantities of parenteral fluids. Anuria developed with an accompanying blood urea of 253 mgm. per cent. Subsequent, ineffectual treatment, consisted of cystoscopic irrigation of both kidneys under high spinal anesthesia. On the tenth day bilateral renal decapsulation was followed immediately by peritoneal lavage with 2,000 c.c. of twice normal saline solution with a 1,100 c.c. recovery of the perfusate. Simultaneously the patient began to void via a urethral catheter as well as pass urine via the renal incision. On repeated days, peritoneal lavage was performed with a total of 6,000 c.c. of twice normal saline solution with recovery of 2,500 c.c. containing 6 gm. of urea. However, recovery was attributed to renal decapsulation.

Although peritoneal lavage was not directly responsible for recovery in the second case, it was noted that the concentration of urea in the peritoneal efflux was higher than that in the blood. The chloride concentration of the dialyzing fluid increased. The knowledge gained from the preceding 2 cases was applied to the subsequent cases. Normal saline solution was used in the third case instead of twice normal saline solution. With this solution the blood urea was decreased from 203 to 195 mgm. per cent. No ill effects were noted until the fourth case in which similar therapy was employed. Death in this case was from pulmonary edema as a result of overloading the patient with water and chlorides.

Five per cent glucose in water was used as the dialyzing fluid in the fifth case. Intermittent lavage permitted recovery of 385 gm. of urea as well as 52 gm. of chloride. Five per cent glucose in normal saline solution was used as the dialyzing fluid in the sixth case. Although no ill effects were observed from the lavage, recovery, as in the previous cases, was attributed to other methods of therapy.

It is obvious from these studies that urea and presumably other toxic products can be removed from the blood stream with clinical improvement, but it is difficult to translate this into statistical terms. The maintenance of the electrolyte balance is most important. Following peritoneal lavage, the concentration of urea in the wash may exceed that in the blood stream.

Intermittent injection and withdrawal is safer than continuous perfusion. The fluid used should permit rapid diffusion of the waste products, should not grossly alter the electrolyte and water balance of the extracellular fluids, should have an osmotic pressure near that of plasma and be adjusted to combat acidosis and alkalosis. Peritoneal lavage is advocated in cases of temporary renal suppression when the return of renal function is possible.

PETER L. SCARDINO, M.D.

Dialysis of Blood for the Treatment of Uremia. E. M. DARMADY. *Proc. R. Soc. M.*, Lond., 1948, 41: 418.

Previously encountered difficulties in treating uremia by blood dialysis having been overcome with the use of a cellophane tube and a method of spreading a small quantity of blood over a large dialyzing surface, the author submits his method for the treatment of uremia.

The patient is heparinized with from 200 to 300 mgm. of heparin. In case sudden hemorrhage occurs, blood transfusions and protamine sulfate are given. Blood is extracted from the radial artery, and controlled synchronized pumps regulate the inflow and outflow. The machine is first filled with compatible blood. The dialyzing tubing is wound around a rotating drum to permit the spread of a small quantity of blood over the dialyzing surface, as well as to agitate the blood. By synchronizing the drums to the pump so that 10 ml. of blood enter the machine for each complete rotation, a better and more even film is produced. The author's instrument has a series of plates 1/16 inch apart through which a tube of cellophane is led. The flow of dialyzing fluid is arranged by means of a number of small tubes in the plates which allow the dialyzing fluid to flow outward from the center in either direction.

The author believes that failures are due to the dialyzing fluids now available and looks forward to a fluid which will be not only isotonic but also isosmotic.

PETER L. SCARDINO, M.D.

The Artificial Kidney: Its Clinical Application in the Treatment of Traumatic Anuria. E. G. L. BYWATERS AND A. M. JOEKES. *Proc. R. Soc. M.*, Lond., 1948, 41: 420.

Lesions of the distal convoluted renal tubule (lower nephron nephrosis) are produced in many ways:

vessel rupture, muscle rupture, electric shock, flogging, hemolysis, Welch's infection, intravenous water in transurethral prostatic resection, intravenous soap in abortion, and sulfonamide hemolysis.

It has been demonstrated that after the first week, the affected epithelium is desquamated and excreted in the urine as a cellular coat to the pigment cast with regeneration and mitosis from the basement membrane, and, finally, diuresis. Prior to the advent of the artificial kidney, methods of combating uremia were usually unsatisfactory. While potassium levels could be reduced with insulin by depositing this electrolyte intracellularly, dilution of the protein metabolites with saline solution frequently produced severe pulmonary edema. Purging and sweating did not remove more than an insignificant amount of metabolites.

The artificial kidney is best suited to that case in which recovery of renal function is expected, that is, one in which either functional disorder or disease affecting the tubules does not involve the glomeruli. The artificial kidney is probably most useful in lower nephron disease.

Details of the 2 cases successfully treated by dialysis are given:

A patient suffering traumatic anuria with a blood urea of 390 mgm. per cent was dialyzed for 5 hours with removal of 32 gm. of urea. The third day after dialysis a secondary rise in blood urea occurred but was overcome by diuresis. The blood urea was decreased by 179 mgm. per cent to 211 mgm. per cent. Recovery was satisfactory.

The second successfully treated case was that of a patient who developed pigment nephrosis following anesthesia. After one 4-hour period of dialysis on the twenty-sixth postcholecystectomy day, 33 gm. of urea were removed which reduced the blood urea from 424 to 264 mgm. per cent. After that, except for a transient blood urea rise, the urine output increased and the renal function as well as the blood urea fell to normal. The author has modified the Kolff apparatus which he describes in detail. The modification avoids the excessive pressures under which the blood was formerly pumped from the machine into the patient's vein. Other technical details are discussed, including the composition of the bath water (Table I) and methods for regulating the venous replacement of arterial outflow.

TABLE IV.—COMPOSITION OF BATH WATER

Constituents	Concentration per 100 ml.	
600 grams NaCl	Calcium	3 mgm.
1,500 grams Glucose	Glucose	1,500 mgm.
200 grams $NaHCO_3$	Chloride (as NaCl)	630 mgm.
40 grams KCl	Sodium	290 mgm.
100 liters tap water	CO_2 (C.P.)*	54 ml.
	Potassium	20 mgm.

*Combining Power

Adjuvant therapy consists of amidopyrine (0.6 gm. 6-hourly for 24 hours), sodium pentothal anesthesia, penicillin, and calcium gluconate. Such substances as thiamine and ascorbic acid have been added to the circulating blood. During the recovery period a high carbohydrate diet has been administered as well as testosterone to increase tubular regeneration. It is suggested that dialysis is applicable in other conditions. Large quantities of aspirin were removed by dialysis from an aspirin poisoning case.

PETER L. SCARDINO, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Syndrome Called Osteitis Fibrosa (Die Begrenzung der Ostitis fibrosa). HANS HELLNER, *Chirurg*, 1947, 17–18: 145, 199.

Konjetzny, who first differentiated giant cell sarcomas from true sarcomas, pointed out that localized osteitis fibrosa can be found in any bone disease, i.e., osteomyelitis, tumors, juvenile cysts, and benign giant cell tumors. The findings of localized osteitis fibrosa indicate only that a tumor or an inflammatory focus in bone caused activation of fibrous tissue within the Haversian spaces. There is usually hyperemia which may be on an inflammatory or mechanical basis with an increased formation of osteoclasts. Increased bone destruction initiates bone formation, increased numbers of osteoblasts, and irregularly dispersed osteoid tissue. The term "osteitis fibrosa" should be limited strictly to one specific condition. There are eight distinct entities.

1. Osteitis fibrosa generalisata cystica (Recklinghausen's disease).
2. Osteitis deformans (Paget).
3. Renal osteitis fibrosa in adults. This disease is identical with that given as number 1. Renal osteoporosis shows no relationship with osteitis fibrosa.
4. Juvenile bone cysts.
5. Polycystic osteitis fibrosa of one or several bones is part of the juvenile bone cysts and does not require a separate classification.
6. Giant cell tumors of early adult life. Cysts and giant cell tumors have some histological features in common.
7. The so-called polyostotic osteitis fibrosa has nothing whatever in common with osteitis fibrosa. The name "precocious puberty with bone dysplasia" is a better term.
8. Renal osteitis fibrosa or renal rickets should be considered as a separate entity.

A discussion of each entity follows:

1. Osteitis fibrosa generalisata (Recklinghausen) is an endocrine disturbance affecting the entire body. The generalized decalcification of the skeleton is based on a disturbance of the mineral metabolism. An adenoma of the parathyroid glands is usually found and may be the cause or the consequence of the metabolic disturbance. The Erdheim theory of secondary involvement of the parathyroids appears to be acceptable. Hypertrophy of the parathyroid glands is found in osteitis fibrosa, osteomalacia, rickets, cancer of bone, multiple myeloma, and osteitis deformans. Hypertrophy of the parathyroid glands usually appears after the demineralization has reached a high level and thus a vicious circle is established. It is the opinion of most authors that an endocrine disturbance of a hypothalamus center causes an "acid" tide of the metabolism which is responsible for the decalcification. Later, an adenoma of the parathyroid glands plays the leading part in the future development of the disease. There is polyuria and polydypsia. There is hypercalcemia and there is hypophosphatemia. Loss of calcium causes a decalcification of the skeleton and muscle weakness. The weakness of the muscles is manifested by decreased electric excitability and disturbance of the muscle metabolism (hypophosphatemia). There is softening of the bones which causes bowing and fractures. There is evidence of decalcification, thinning of the cortices, and widening of the marrow cavity. (Decalcification of the skeleton can be noted on the roentgenogram only after 10 per cent of total calcium loss). The changes which made Recklinghausen consider his disease as a "cystic degeneration of the entire skeleton" are a secondary manifestation.

One must remember that he is observing certain phases of a syndrome. Cysts and giant cell tumors in osteitis fibrosa can be easily discovered clinically because of the local bone enlargement. Occasionally the weak bone shell perforates and severe hemorrhages occur. Cysts of osteitis fibrosa are the result of organization of hemorrhages and are therefore later stages of giant cell tumors.

Single bone cysts usually occur in early life. Osteitis fibrosa generally is found between the ages of 40 and 45 and mostly in women. The diagnosis of a single giant cell tumor in adults therefore warrants a thorough examination of the entire skeleton and the metabolism. Local surgical treatment, i.e., scraping of cysts and giant cell tumors, and the insertion of bone grafts will be of no avail if an adenoma of the parathyroid glands is present. Excision of the adenoma will eliminate the vicious circle which causes severe decalcification of the skeleton, and help in the treatment of nephrolithiasis, pyelitis and albuminuria. Muscular power will greatly improve. Cysts and giant cell tumors can be treated surgically after the parathyroid glands have been removed. In spite of the fact that the parathyroid plays a secondary part in osteitis fibrosa, occasionally complete recovery has been observed after removal of the parathyroid glands.

2. Osteitis deformans (Paget). In Paget's disease a chronic nonspecific osteitis is found. There is a hereditary factor as well as a constitutional factor. There is no endocrine disturbance. The blood content of calcium and phosphorus is unchanged and may occasionally show a decrease of calcium and an increase of phosphorus. Parathyroid adenomas are absent. Occasionally there is parathyroid hyperplasia similar to that found in any other bone disease in which decalcification occurs. There is a serous inflammation of the bone marrow, and a disturbance of the bone lamellae structure which is manifested by irregular apposition and destruction

of the bone. A mosaic-type pattern with increased cement lines is noticeable; this is characteristic but definitely not specific of Paget's disease. The slow change in bone structure in Paget's disease leads to an increase in thickness of the bones. The bones are weak and spontaneous pathologic fractures occur. Roentgenograms of the entire skeleton are characteristic. Coxa vara, saber-shaped tibia, and deformities of the radius are common. The full blown picture of Paget's disease is characterized by a large head, thick bones, and apelike posture. Surgery is indicated in the case of compression of the spinal cord or of the spinal nerves within the foramina.

3. Renal osteitis fibrosa in adults. The differentiation of a renal form of osteitis fibrosa generalisata in adults in which the skeletel changes are associated with kidney changes is not justified. In 50 per cent of all cases of osteitis fibrosa in which there are changes of the mineral metabolism, the formation of cysts and brown tumors and damage of the kidneys are found. Uehlinger suggests the name "renal osteopathy of adults" for bone changes with kidney damage. Mandibular changes observed in experimental poisoning with platinum, gold, iron, or tin reach the jaw by way of the kidneys. Damage of the kidneys may cause decalcification of the skeleton. Hyperplasia of the parathyroid glands occurs secondarily.

Giant cell tumors and bone cysts occur without any other signs and are found in adults as well as children. Adults are more likely to have giant cell tumors and children more often cysts. The term "local osteitis fibrosa" is not good.

4. Bone cysts in infants. Bone cysts found in children and adolescents have no relation to Recklinghausen's disease. No known case of a single bone cyst followed up for 20 years later developed into Recklinghausen's disease. Hemorrhages within the bone marrow may be the cause of bone cysts or the cysts may be due to mesenchymal tumors (hamartia). Giant cell tumors are true tumors which may precede the bone cysts. The juvenile bone cyst is usually discovered after it has reached a considerable size or has caused a spontaneous fracture. The bone cyst originates either by hamartia of tissue composed of fibrocytes or from bone marrow hemorrhage. The histological picture will vary according to the biopsy site and the etiology of the lesion. Juvenile bone cysts are located in tubular bones within the metaphysis and are found in children under 15 years of age. Bone cysts found in adults usually originate from giant cell tumors. The upper humerus, the femur, and the tibia are more frequently affected than any other bones. The roentgenogram is that of a multilocular cyst and is well demarcated proximally and distally. The cortex is very thin. There is no periosteal reaction. There is no disturbance of mineral metabolism. There is never any evidence of hyperparathyroidism. A biopsy is not necessary. One is not unlikely to mistake a bone cyst for a sarcoma on x-ray examination or on the basis of a clinical examination.

The treatment of osteitis fibrosa consists of the insertion of bone grafts. In cases of incomplete fracture, immobolization alone may lead to complete cure. At operation the juvenile cyst reveals a chocolate brown or serous colored fluid. A "brown tumor" type of tissue is found only in the walls of the cyst or "giant cell tumor" type tissue. The insertion of bone grafts is important because it takes a long time for big bone spaces to heal without the help of additional osteogenic tissue. "Bone cysts" of flat bones in children usually are composed of giant cell tumor tissue. Rarefaction in bone on roentgenograms may indicate a true cyst or a giant cell tumor. Experience has taught the author that large multilocular cyst formations in the long bones of children usually indicate juvenile cysts and that smaller multilocular cysts with thick partitions within the epiphyses in adults indicate giant cell tumors. Small cysts within the cortex in adults usually contain giant cell tumor tissue.

5. Polycystic localized osteitis fibrosa may affect one bone or an entire extremity. A similar picture is found in juvenile bone cysts. Histological examination reveals giant cell tumor tissue and cyst formation. There is no endocrine disturbance, and there is no disturbance of mineral metabolism. The treatment is the same as for juvenile bone cysts.

6. Giant cell tumors. The syncytial fibroblastic giant cell tumor formation which is found reactively in osteitis fibrosa generalisata occasionally is observed separately and has to be considered as a true tumor. There is no disturbance of mineral metabolism. It seems unreasonable to believe that giant cell tumors in osteitis fibrosa generalisata are the result of bone marrow hemorrhages and to assume that giant cell tumors which occur independently are true tumors. Dense fibrous tissue within a scar may resemble a true fibroma. Hyperostoses may resemble true osteomas. The benign giant cell tumor usually occurs within the epiphyseal ends of the long bones in young adults. Giant cell tumors occur also in flat bones. The cortex becomes thin because of the expansive growth of the tumor and may occasionally simulate growth by infiltration. Occasionally perforation of the periosteum is seen. In these cases differential diagnosis from osteogenic sarcoma is very difficult and the biopsy is the deciding factor. The treatment consists of curettage implantation of bone grafts and fusion in cases in which joint destruction is present. Unfortunately there is a malignant variant of giant cell tumor which is a true sarcoma. Repeated incomplete excisions of the tumor, irradiation, and postoperative infection may be the cause of malignant changes.

Small cystic foci are occasionally seen in the cortices of the long bones. The histological examination usually shows giant cell tissue and rarely cyst formation. These cysts are caused by endogenic or exogenic causes, for example, bacterial emboli.

7. Polyostotic osteitis fibrosa. This is an endocrine disturbance associated with changes in the bones. There is never a parathyroid adenoma

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present. A better term would be polyostotic fibrous dysplasia associated with pigmentation of the skin and endocrine dysfunction. The familiar occurrence, its appearance in young individuals, and its unilateral occurrence points to a gene-associated condition. There is no metabolic disturbance. There is always precocious puberty.

8. Renal osteitis fibrosa in children. This condition is known as renal rickets and was formerly known as renal dwarfism. Renal rickets is a disease which occurs in early adolescence with retardation of growth, pallor, fatigue, polyuria, and polydypsia. The urine contains albumin and cylinders. There is hyperproteinemia and increased blood pressure. Fractures and bowing of the long bones are found. Occasionally the x-ray examination reveals signs characteristic of rickets. Irregular epiphyseal lines, cup formation, osteoporosis, and infractions are present. Originally, interstitial nephritis was considered to be the cause of renal rickets. More recently, kidney atrophy and pyelonephritis were considered the etiologic factors involved. In many cases an infection is implanted in a congenital malformation of the kidneys.

The bony changes associated with chronic insufficiency of the kidney usually cause parathyroid hyperplasia, which is also found in rickets. Eger caused kidney damage in rats with uranium nitrate, which usually was followed by hyperplasia of the parathyroid gland and osteitis fibrosa changes in bones. The changes in the bones are caused by way of the parathyroid glands and are similar to the ones observed in renal rickets. It was found that the bone condition was greatly improved by the administration of vitamin D and AT 10. Vitamin D has no influence whatsoever on osteitis fibrosa. Renal rickets is a disease which sometimes resembles osteitis fibrosa and sometimes true rickets.

Osteitis fibrosa is characterized by (a) a mineral metabolism disturbance with a negative calcium balance and a hypophosphatemia (organically); (b) permanent changes in the bones and parathyroid adenoma (morphologically); and (c) muscle weakness, deformities due to bone cysts and bone tumors, and secondary damage to the kidneys (clinically). The cause of osteitis fibrosa probably is a complex disturbance of the endocrine glands with particular emphasis on the parathyroids. A vicious circle is set up with an increased amount of decalcification of the skeleton. This sets up another vicious circle because, as the result of the damage to the kidneys, "acidosis" follows and this in itself again causes decalcification of the skeleton. In rickets the following symptoms are found: (a) organically: disturbance of the mineral metabolism, especially lowering of the phosphorus blood levels with negative phosphorus balance; (b) morphologically: a decrease in calcification within the zone of temporary calcification at the epiphyses, increased formation and noncalcified osteoid in the same area; (c) clinically: softening of the bones, especially of the calvarium and growth disturbance of the epiphyses with enlargement and bowing of the bones. In addition there is disturbance of the tooth enamel. The calcium and phosphorus blood levels are important, as well as the calcium-phosphorus ratio. Rickets occur at a calcium-phosphorus ratio of at least 4 to 1. The excess calcium salts can be excreted only with the help of phosphorus, with the result of a decrease in the phosphate salts. The phosphate concentration in the serum drops below the level necessary for ossification. Vitamin D medication not only improves the intestinal phosphorus resorption but also improves the utilization and retention of phosphorus in the bones. In infantile rickets hypophosphatemia is discovered prior to the bony changes. Decalcification of the skeleton goes hand in hand with changes in the mineral metabolism. It may be due to: (1) dietary calcium deficiency, (2) deficiency of phosphorus, or a discrepancy between the calcium and phosphorus levels, (3) lack of vitamin D, (4) lack of ultra violet rays, (5) lack of vitamin C, (6) disturbance of the endocrine glands and (7) a general disturbance of the metabolism resulting in acidosis. There is a definite relation between vitamin D and the parathyroid glands, calcium and phosphorus, metabolism, vitamin D and fat metabolism, and between vitamin D and lack of ultra violet rays, and between acidosis and parathyroid activity. Osteitis fibrosa generalisata cannot be considered exclusively as a bone disease. The calcium-phosphorus metabolism is disturbed and since the skeleton is the main source of these minerals it shows marked changes in its morphology. There is a common "central origin" for both osteitis fibrosa and diabetes. Both appear predominantly around the time of the menopause at the time when there is a "re-arrangement" of the endocrine glands. Women are predominantly affected, and pregnancies prior to the onset of the symptom influence the course of the disease.

Osteopathies in which decalcification of the skeleton occurs as evidenced by osteoporosis may lead to pathologic fractures. The more severe decalcifications lead to malacias which cause bowing of the bones.

GEORGE I. REISS, M.D.

Ischemic Contracture, Local, in the Hand. STERLING BUNNELL, EDWARD W. DOHERTY, and RAYMOND M. CURTIS. *Plast. Reconstr. Surg.*, 1948, 3: 424.

Ischemic contracture of the hand is a disabling fibrous degeneration of the intrinsic muscles of the hand which can be improved by surgery. It is caused by a tight plaster cast, injury to the brachial plexus, trauma to the two main arteries of the arm, or any other type of constricting bandage causing decreased circulation in the hand.

The hand assumes the position of a claw and there is adduction of the thumb. The fingers are flexed at the proximal joints and extended at the distal joints and there is flexion of the metacarpophalangeal joints. This position is similar to the one seen in combined paralysis of the median and ulnar nerves. The changes in the hand are permanent. The pulse is present except when the main artery is interrupted.

The tenseness of the interossei is demonstrated by failure of active or passive flexion of the distal two joints of the finger on hyperextension of the metacarpophalangeal joints. There is little or no active motion of the thumb.

Incision of the fascial covering of each intrinsic muscle is beneficial in early cases. In older cases, stripping of the interossei and allowing them to retract distally is of benefit only if there is still some activity in the muscle. In cases in which only fibrosis is discovered, complete tenotomy is done and a sublimis tendon is transferred at a later date.

The thumb is mobilized by bisecting the cleft and by holding it in that position by a bone block or by a pulley transfer operation for opposition. The defect in the skin is closed with a skin flap.

GEORGE I. REISS, M.D.

Early Coxa Plana. Age Studies. FOLKE STÅHL. *Acta. orthop. scand.*, 1948, 17: 180.

The author's study was undertaken to determine the age of patients at the onset of coxa plana, and whether an earlier age of onset is associated with more rapid healing. The healing time in coxa plana is compared with that of aseptic necrosis of the femoral head following closed reduction of congenitally dislocated hips.

In order to estimate the duration of the disease prior to the initial roentgenogram, serial films of 103 cases were studied. This information, together with opinions expressed in the literature, helped to establish the following criteria:

Cases presenting early changes accompanied by more or less pronounced sclerosis of the caput epiphysis were considered as having existed for at least 3 months. If conspicuous fragmentation was visualized its duration was believed to have been 9 months, and if the healing process was evident on first examination it was considered that the pathological process had existed at least 18 months prior to examination. A more accurate evaluation of the ages of the disease was deemed impossible.

The average age of patients at the first examination was 7.7 years. The highest age was 13 years and 1 month, the lowest, 2 years and 5 months. The lowest estimated age at onset of the disease was 2 years and 2 months and the highest age at onset was 13 years and 1 month in a patient who was under observation for the opposite earlier affected hip. The average estimated age of patients at onset was 6.6 years. Usually, the condition was observed about 1 year prior to the first visit to the diagnosing surgeon, so that the disease had progressed markedly before treatment was initiated.

Beginning resorption of earlier affected parts was considered the first sign of healing, and on this basis the average healing time was 16 months. The shortest period required for healing was 7 months and the longest at least 34 months. Healing was a little slower in the older age groups.

Of the small total of 22 cases of coxa plana which were followed up at regular intervals (from the beginning of the condition until restitution with substantially normal bone structure in the caput epiphysis), the average period of evolution was 36.4 months—the shortest, 21 months and the longest, 54 months. The average healing time in patients under 7 years of age was 35.0 months, and in patients over 7 years of age, 38.6 months.

In 22 cases of epiphysitis following reposition of a congenital hip dislocation, the average time of onset was 3.7 months following reduction; the shortest interval was 2 months and the longest, 7 months. The average age of these patients was 2.7 years, the youngest being 1 year old and the oldest 7 years old at the onset of the epiphysitis. In 16 cases studied sufficiently to determine the onset of healing, 8.4 months was the average time, 5 months was the shortest, and 12 months the longest time. This may be compared with an average of 16 to 18 months in coxa plana. Only 6 cases were followed long enough to determine the time required for complete healing after reposition—an average period of somewhat less than 2 years.

The author's analysis seems to bear out the generally assumed fact that aseptic necrosis of the femoral head in childhood heals in the shortest time in the youngest patients.

KENATH H. SPONSEL, M.D.

Significant Anatomic Relations in the Syndrome of the Scalene Muscles. HOMER D. KIRGIS and ADRIAN F. REED. *Ann. Surg.*, 1948, 127: 1182.

Bilateral dissections of the area in question were done on 56 cadavers in an effort to discover significant anatomic relations. Particular attention was directed toward the modifications in structure and anatomic relations of the scalene muscles, the components of the brachial plexus and the adjacent vessels.

In all cases, most of the fibers of the scalenus anticus muscle arose from the anterior or inferior surface of the anterior tubercles of the cervical transverse processes from the third to the sixth cervical vertebrae, inclusive. These fibers, even if in marked spasm, are not strategically located to compress adjacent roots of the brachial plexus. The only possible way for this portion of the muscle to contribute to the syndrome is by elevation of the rib to which it is inserted with consequent trauma to the lower trunk of the brachial plexus. It is possible that such elevation of the first thoracic rib might, in some cases, constrict the lumen of the subclavian artery.

The location and size of the scalenus medius muscle are not suitable for the muscle to assist greatly in elevating the first rib. The effectiveness with which the scalenus medius muscle functions in raising the rib is to a large extent dependent on the size of the muscle and the distance of its insertion from the point about which the rib rotates as it is raised. The distance between the point of emergence of the first thoracic nerve from the intervertebral foramen and the point at which it crosses the scalenus medius muscle is an index of the amount of traction which

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may be exerted upon the nerve with contraction of the muscle. This distance was established approximately by measuring the interval between the head of the second rib and the anterior point of attachment of the scalenus medius to the first rib. In practically all dissections, the lower trunk of the brachial plexus rested on the inferior portion of the anterolateral margin of the scalenus medius muscle as it descended into the upper extremity, regardless of the relation between the attachments to the first rib of the scalenus anticus and medius. The anterolateral border of the spastically contracted scalenus medius muscle may act as a sharp ridge over which the component roots of the brachial plexus, especially the seventh and eighth cervical and the first thoracic roots, are drawn by the normal activity of the upper extremity.

The author concludes that it is impossible for the main body of the scalenus anticus muscle, that is, that portion arising from the anterior surfaces of the cervical transverse processes, to compress directly the components of the brachial plexus. This part of the muscle is important in the syndrome only through its activity in elevating the first rib and in serving as a rigid structure against which the displaced subclavian artery may be compressed. However, direct compression of the fifth, sixth, and seventh cervical nerves, especially of the latter two, may result from contraction of the bundles of muscle fibers which arise from the inferior and posterior aspects of the cervical transverse processes and join the main body of the scalenus anticus muscle.

There are several factors which are of importance in the production of this syndrome of the scalenus muscles, namely, (1) elevation of the first rib by the activity of the scalenus anticus and medius muscles aided by the scalenus minimus muscle, when the latter is present, with irritation to the lower components of the brachial plexus; (2) contraction of the "posterior" components of the scalenus anticus muscle with compression of the immediately adjacent nerve root or the subclavian artery; and (3) traction of the components of the brachial plexus, especially the seventh and eighth cervical and first thoracic nerves, across the anterolateral margin of a spastic scalenus medius muscle.

The vertebrocostal ligament occupied the characteristic position of the scalenus minimus muscle bilaterally in 10.7 per cent and unilaterally in 3.5 per cent of the dissections. The attachments were found to be similar. This ligament becomes relaxed as the rib is elevated. The situation in which it would carry out such a function most efficiently is one in which the scalenus medius contracts sufficiently to displace the first thoracic and eighth cervical nerves but not enough to elevate the first rib.

The surgical treatment of the scalene muscles should include resection of the major portion of the scalenus anticus and of the scalenus minimus or vertebrocostal ligament when either of the latter is present. In addition, if it is apparent that the lower trunks of the brachial plexus may be traumatized by angulation across the anterolateral border of the scalenus medius, as is suggested by the approximation of its insertion to that of the scalenus anticus, the portion of the scalenus medius immediately posterior to the lower trunks of the plexus should be resected.

C. FRED GOERINGER, M.D.

Traumatic Necrosis of Pretibial Muscles. CARL PEARSON, RAYMOND D. ADAMS, and D. DENNY-BROWN. *N. England J. M.*, 1948, 239: 213.

A 24 year old man who had emigrated from Greece less than a year prior to this report was employed as a bus boy, and his duties required a considerable amount of walking. After competing with two companions in broad jumping on a cement pavement, he experienced sharp pains in the anterior aspect of both lower legs.

Examination revealed a foot drop bilaterally, and complete paralysis of the anterior tibial muscles, the extensor digitorum longus, and the extensor hallucis longus muscles. The neurologic examination was negative. The man's temperature was 100.8 degrees, and albuminuria and mild leucocytosis was found. Tests for parasites and venereal diseases, and x-ray examinations were negative.

On the third hospital day the patient appeared ill, and his temperature rose to 102.4 degrees. The patient was given penicillin intramuscularly. On the fourteenth hospital day he was feeling quite well, but the foot drop and the paralysis of the muscles persisted. A biopsy of the anterior tibial muscle revealed that parts of the skeletal muscles were replaced by fibrous tissue. In some instances different stages of degeneration were observed. There was some increase of the interstitial fibrous connective tissue. There were many macrophages containing hemosiderin, and fewer lymphyocytes. There was thickening of the walls of the small arteries.

The patient was seen 5 months after the illness. Bilateral foot drop and paralysis of the anterior tibial muscles were still present. A possible relation of this condition to the so-called "shin splints" was considered. It is believed that the violent contraction of the anterior tibial muscles may have caused rupture of the muscle fibers and hemorrhage, and expansion of the muscle fibers within the tight fascial compartment may be responsible for the ischemia and degenerative changes.

GEORGE I. REISS, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Open Reduction for Slipping of the Upper Femoral Epiphysis. STEN FRIBERG. *Acta orthop. scand.*, 1948, 17: 189.

At the Karolinska Institute the author has under his care a series of 70 patients, in the early "preslipping" state of slipping of the upper femoral epiphysis, who have been treated by the blind method of Smith-Petersen nailing. This method of

treatment is used in those cases in which at least two-thirds of the slipping surfaces are in contact. He believes that the so-called closed reduction is largely an illusion, and the trauma so great that necrosis often results. He does not find traction as satisfactory as the nailing procedure.

Greater slipping occurring at the time of the initial examination is a more serious problem. Since 1944, the author has performed open reduction and nail fixation in 13 severe cases. In the earliest case there was complete acute displacement, which prompted this manner of treatment. One other patient with acute displacement was so treated. Subsequently, 11 patients in whom the slipping occurred more slowly have been subjected to open reduction by means of a wedge osteotomy and the nailing procedure. The wedge is taken from the femoral neck adjacent to the epiphyseal line, and the base of the wedge is faced ventrally and cranially. The dimensions of the wedge are determined by the degree of slipping and on its estimated duration. In early cases satisfactory reduction is obtained with smaller wedges.

The author wishes to achieve reduction without placing a stretch on the posterior soft tissue connections; therefore the wedge should be large enough to avoid stretching the posterior structures which carry the circulation to the head. He believes that this may explain why no head necrosis has occurred in this series of 11 cases. He further advises that the nail be directed posteriorly into the head in order to rotate it into the osteotomy line; anterior position of the nail might further displace the head. Illustrations demonstrate the author's insistence on good lateral roentgenograms of the hip.

In 12 of the 13 severe cases, the preliminary results have been judged. In 10 of the patients the results are objectively and subjectively very good, and necrosis has not been observed up to the present time. In the eleventh case total necrosis was present before operation. In the twelfth case reduction was not satisfactory; this case showed partial necrosis at one time, which rapidly resolved. The final case was one in which a slight infection occurred postoperatively, with some decalcification and narrowing of the joint space. The patient considers himself symptom-free, but the future of the joint is doubtful.

The author believes that open reduction should be unnecessary in cases in which the diagnosis is made very early. From a technical point of view it is rather difficult, and the necessary condition for a good functional result is an exact reduction. With regard to the late results, nothing can be said at this time.

Preoperatively the radiologic examination revealed slight narrowing of the joint space, and at operation a softening of the cartilage was seen. A normal hip cannot be expected, but the results must be evaluated by comparison with the condition of these patients without operation.

KENATH H. SPONSEL, M.D.

Hamstring-Tendon Transplantation for the Relief of Quadriceps Femoris Paralysis in Residual Poliomyelitis. A Follow-Up Study of 134 Cases. J. R. SCHWARTZMANN and C. H. CREGO, JR. *J. Bone Surg.*, 1948, 30-A: 541.

A total of 134 hamstring-tendon transplantations for the relief of residual quadriceps paralysis in poliomyelitis has been observed, including the original 63 cases reported by Crego and Fischer in 1931, in which the biceps femoris tendon alone had been transplanted to the patella. The follow-up periods ranged from 1 to 22 years. An analysis of the end-results is presented, and the principles, technique, and conclusions in the original report are modified.

The results of the present analysis of cases are reported according to the following grouping: (1) transplantation of the biceps femoris alone to the patella; (2) transplantation of the biceps femoris and semitendinosus to the patella; and (3) transplantation of the semitendinosus alone to the patella.

An excellent method of evaluating the end-results is described in the article.

From the standpoint of muscle power, it is believed that the patients eligible for reconstructive surgery are those who have sufficient residual muscle power to warrant the reasonable expectation that apparatus can be discarded postoperatively. Active cooperation on the part of the patient is essential for postoperative rehabilitation, and mental inability to co-operate is, therefore, a contraindication to reconstructive surgery.

Fixed deformities, such as flexion of the hip, flexion of the knee, and equinus of the foot, must be corrected before hamstring transplantations.

The operative technique remains the same as that originally described by Crego and Fischer for transplantation of the biceps femoris alone. In transplantation of the biceps and semitendinosus simultaneously, the additional procedure of detaching the semitendinosus from its insertion in the upper portion of the tibia, and drawing the tendon out through an incision over the musculotendinous juncture of the semitendinosus on the posteromedial aspect of the thigh is carried out. The fascia of the muscle is split longitudinally toward its origin, sufficiently to allow the tendon to be threaded forward through an oblique subcutaneous tunnel toward the patella. Care must be taken that the tunnel is directed in a gradually oblique direction toward the patella, and that the fascia of the muscle is opened sufficiently to allow a gradual oblique pull of the muscle on the patella, since a sharp angular pathway to the patella decreases the efficiency of the muscle pull. This principle is brought out in detail in the technique of biceps transplantation. The semitendinosus tendon is then anchored into the body of the patella.

It is important to stress the necessity for care in dissecting the biceps and semitendinosus tendons from their insertions, since it is essential to preserve the tibial and fibular collateral ligaments intact.

Upon completion of the operation, the extremity is immobilized in plaster of paris from the groin to the

toes, with the knee in from 175 to 180 degrees of extension. Physiotherapy is begun between the third and fourth weeks after operation; complete removal of plaster during the eighth week is followed by active flexion of the knee against gravity. As soon as sufficient power has been obtained to stabilize the knee in extension, the patient becomes ambulatory without braces. It is now believed that postoperative braces may favor rather than prevent the development of recurvatum.

Factors causing failure of the operative procedures were: (1) lateral displacement of the patella; (2) recurvatum; (3) total failure of the transplant to function; and (4) instability of the knee. The authors believe that the development of recurvatum will be kept to a minimum if (1) fair or better power is present in the gastrocnemius; (2) postoperative hyperextension of the knee in plaster is avoided; (3) equinus deformity is corrected before weight bearing is begun postoperatively; (4) postoperative braces which will throw the knee into recurvatum are avoided; and (5) diligent postoperative physical-therapy, to promote active flexion of the knee, is carried out.

The following conclusions are given: (1) hamstring substitution for residual paralysis of the quadriceps muscles in poliomyelitis is a highly satisfactory operative procedure; (2) simultaneous transplantation of the biceps femoris and semitendinosus to the patella is a much more satisfactory procedure and produces far better results than transplantation of the biceps alone. RUDOLPH S. REICH, M.D.

Intraepiphyseal Arthrodesis in the Treatment of Tuberculosis of the Knee in Children (La résection intra-épiphysaire dans le traitement de la tumeur blanche du genou chez l'enfant). PIERRE GROULT. *Lille chir.*, 1947, 12: 289.

Intraepiphyseal arthrodesis was first used by Syme and by Ollier and was later discarded because of high mortality and frequent recurrences. In later years, and especially after 1925, conservative treatment of tuberculosis was adopted and "nonintervention therapy" was favored. The author favored resection of bone and arthrodesis as the operative treatment of choice.

Calve and Galland reported the results of conservative treatment of tuberculosis of the knee: cure with restitutio ad integrum in 25 per cent of the cases, cure with ankylosis in 10 per cent, and cure with partial ankylosis and a tendency to flexion deformities in 65 per cent. Sorrel reported results on 271 cases: cure in 43 per cent of children, ankylosis with good position in 30 per cent, and poor results with incomplete ankylosis in 20 per cent. It is generally agreed that "cure" does not exclude a recurrence in from 3 to 5 years.

A number of intra-articular, juxta-articular, and para-articular ankyloses of the knee and their disadvantages are enumerated. It is pointed out that in most arthrodeses, all or part of the cartilage is left undisturbed.

Best results were obtained in children between the ages of 12 and 13 years. Operation is not done until 8 months have elapsed since the onset of the infection. The temperature must be normal for at least 2 months. Good results were observed in old cases in which healing would not occur and in cases in which ankylosis did not occur because of interposed cartilage, also in cases of ankylosis in poor position.

The operation is contraindicated if there are acute draining sinuses, in generalized infection, in cases with multiple tuberculous lesions, sinuses, or early ankylosis, and in cases in which the diagnosis is not definitely established.

The technique is as follows: under general anesthesia and with the use of a tourniquet around the thigh a large "U" incision is made about the patella and is carried down through the aponeurosis. The patellar tendon is sectioned. The knee is slowly flexed which severs all fibrous bands. After freshening up of the condyles, the tibial plateau, and the posterior aspect of the patella, the ends of the epiphyses are resected with correction of any existing deformity. Sequestra and necrosis of the synovial membrane are removed. The wound is closed and a cast is applied with the knee in slight flexion.

Forty children were operated on by intraepiphyseal arthrodesis. Two died because of shock (operation was performed without a tourniquet). In each of 38 patients a good ankylosis was found 3 or 4 months postoperatively. Three patients developed genu recurvatum. There was some slight growth disturbance following this procedure which probably would have occurred even if the operation had not been carried out. GEORGE I. REISS, M.D.

Positive Pressure in Arthrodesis of the Knee Joint. J. C. CHARNLEY. *J. Bone Surg.*, 1948, 30-B: 478.

The method of arthrodesis of the tuberculous knee joint, described by Key in 1932, was utilized by the author in 15 consecutive cases. Clinical union was detected at the first inspection, in from 12 days to 6 weeks after operation. By this method the total period of disability was reduced to 3 months. In 6 cases the operation was performed for old tuberculous disease of the knee joint with fibrous ankylosis in bad position, and in 9 cases for osteoarthritis. Three mechanical factors which might be responsible for this very early clinical union were examined; compression is believed to be the main factor, although fixation is also important. The technique used in these cases is as follows:

Under a tourniquet the skin is incised in the midline, and the patella is excised. The knee is flexed, and the bone ends are sawn in such a way as to give flat surfaces of cancellous bone which, when opposed, leave the limb almost but not quite straight. The bone surfaces are held together by an assistant and the edges of the skin wound are temporarily approximated by one or two volsella. This enables two parallel Steinmann nails to be passed, one through the upper end of the tibia and one through the lower end of the femur, without tension on the skin sur-

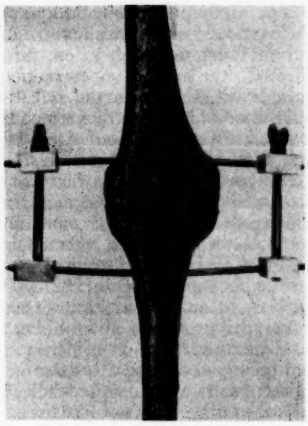

Fig. 1.

Fig. 2.

Fig. 1 (Charnley). Arrangement of nails and clamps on femur and tibia. Note the coaptation.
Fig. 2. Shows the "hairline" fit of the joint surfaces seen at operation.

rounding the nails when the wound is finally sutured. The nails are 4 mm. in diameter and 9 or 10 inches long. The projecting ends are connected by special screw clamps and the wing nuts are tightened until the nails bow under the compression force. In contrast to the postoperative technique utilized by Key, in which the pins were incorporated in a plaster cast, the author used a Thomas splint.

Arthrodesis of the knee joint by other methods may take an average time of 6 months, and there is an appreciable incidence of failure. The feature of this technique is the accuracy of timing which is possible. It is known precisely when bone union will occur. When compression is used in the manner described it may be predicted with certainty that the clamps can be removed after 4 weeks with the knee showing clinical union, that union by bone will be present in eight weeks, as indicated by the absence of pain on straining the ankylosis, and that the patient will be fit for re-employment by the end of the third month. Union takes place between two perfectly co-apted surfaces of cancellous bone with intact circulation. Union of the arthrodesis is thus comparable to that of a fracture without displacement, under ideal conditions. Both the cut bone surfaces share actively in osteogenesis. By contrast, methods of arthrodesis which depend upon a bone graft seem illogical. Though it is customary to state that a bone graft can be used to combine the functions of internal fixation and osteogenic stimulation, in actual fact a graft provides very imperfect fixation, and cortical bone has less power of osteogenesis than the bones which it joins together.

The author indicates that bone grafts are capable of mechanical function in not less than 4 or 5 months. The graft is less osteogenic than the substance of the bones which form the joint, and it provides inefficient internal fixation.

A theory is suggested that compression, even in the presence of slight movement, acts by producing a fixed "hinge" without shearing movement; at this point a bridge head of flexible osteoid tissue is established, in which ossification inevitably takes place despite a slight bending movement. A second theory is suggested that high compression forces stimulate early union by liberating bone salts at points of maximum pressure through the action of osteoclasts, and that the local excess of bone salts is redeposited under cellular activity within a range of a few millimeters where there is no pressure.

C. Fred Goeringer, M.D.

The Tendency Toward Conservativism in the Removal and Subsequent Reparative Surgery of Bone Tumors of the Articular Extremities at the Knee Joint (Indirizzi di chirurgia conservativa e riparatrice nei tumori ossei degli estremi articolari del ginocchio). G. Gherlinzoni. *Chir. org. movim.*, 1948, 32: 189.

Thirteen bone tumors of the juxta-articular bone ends at the knee joint are reported. These new growths included a giant cell tumor which had recurred after surgical removal, a myeloblastoma or immature giant cell tumor as distinguished from the less malignant mature giant cell tumor of Scaglietti, a sarcomatous metaplasia of a myeloblastoma, 5 myeloplastic sarcomas, 2 osteogenic sarcomas, and 3 chondrosarcomas.

The Putti-Juvara operation was done in all of these patients. This consisted of the resection of the end of the affected bone followed by the turning upside down of a massive implant from the end of the apposed bone, and intramedullary fixation in the usual manner. The other end of the implant was fixed to the surface of the parent bone with a circular ligature of catgut or of wire. The length of the

implant was kept down to between 15 and 18 cm., even at the expense of shortening the extremity.

Consolidation of the implant was obtained in 8 of these cases following an average period of immobilization in plaster of 15 months. There was an average shortening of the limb of 3 cm. Pseudarthrosis developed in 3 instances; in 2 of these the faulty result was due to suppurative processes. In no case was the pseudarthrosis subjected to any further measures.

In 2 of the chondrosarcomas local recurrence developed and the limb was amputated. The patient with the sarcomatous metaplasia of the myeloblastoma and the 2 patients with osteogenic sarcoma, which was frankly malignant, have survived the operation, the one for 25 years and the other for 3 years. The patients with the immature giant cell tumor (myeloblastoma, the chondrosarcoma, and the myeloplastic sarcoma) died of visceral metastases in from 3 to 4 years following the operation.

The author believes that the results procured in this series of cases justify the present tendency toward conservatism in the surgical treatment of these conditions. JOHN W. BRENNAN, M.D.

Arthrodesis of the Ankle Joint. J. CRAWFORD ADAMS. *J. Bone Surg.*, 1948, 30-B: 506.

During the last 4 years, the technique of transfibular arthrodesis has been performed in 30 cases at a London Hospital. The author presents 2 case reports, accompanied by 4 illustrations depicting the operative technique most adequately. The author's method of operation is as follows:

A 5 inch incision is made over the lower end of the fibula and the fibula is exposed subperiosteally; it is divided 3 to 4 inches from its lower end, removed from its bed, and prepared for an onlay graft by splitting off its entire inner cortex. The lower end of the tibial (lateral) bed is prepared by removing all soft tissues commensurate with the size of the onlay. The ankle joint is fully exposed. All available interarticular cartilage is removed until the foot rests in the optimal plantigrade position. The fibular graft is immobilized by three long transcortical screws, one of which grips the astragalus. The wound is closed. A plaster of paris cast is applied. Weight-bearing is encouraged after 2 weeks.

Because of its simplicity—adequate exposure, close contact of the onlay graft from the tibia clear across the joint and onto the astragalus—the operation is conducive to a formidable arthrodesis of the ankle joint. As an alternative procedure, the author suggests the insertion of a three-flange nail from the os calcis into the shaft of the tibia.

SAMUEL L. GOVERNALE, M.D.

The Surgical Treatment of Hallux Valgus (Il trattamento chirurgico dell'alluce valgo). D. LOGRÒSCINO. *Chir. org. movim.*, 1948, 32: 81.

Sixty patients with hallux valgus were operated upon by various methods. In fact, it is considered that no one operation can be set up as a standard; every patient must be operated upon by a technique which is suitable to the particular conditions found. At the Rizzoli Institute in Bologna, Italy, where this material was collected, the operative correction by only those methods which involve the soft tissues have been largely abandoned and these techniques have been relegated to the position of occasional accompaniments to the skeletal procedures. This tendency may arise in part from the fact that the Rizzoli Institute tends to receive the more severe types of deformity, so that only the more radical procedures on the bones and joints affected would seem to offer assurance against recurrence.

In 16 patients the bony and articular changes were so severe that only an attempt at arthrodesis seemed indicated; however, this procedure should always be regarded as an ultimate refuge. In 4 instances the basal phalangeal bone was excised after the method of Alsberg, and the results were, on the whole, satisfactory; however, the author does not like to sacrifice this bone since its joint surfaces are usually intact and the method does not correct the spread of the first metatarsal which is the basis of the entire deformity.

On the whole the operation most commonly done in the moderately advanced conditions has been some form of osteotomy on the first metatarsal bone. In fact, the author has himself developed an operative technique which he has not seen previously described and therefore describes it in considerable detail. His operation consists essentially in the usual approach for a cuneiform osteotomy of the head of the first metatarsal bone; however, when this has been accomplished, a second incision is made over the proximal end of the first metatarsal and this bone is again osteotomized, this time transversely. The cuneiform fragment is then implanted base side out into the new osteotomy tract, so as to throw the splayed first metatarsal toward the second metatarsal, from which position it has gradually diverged. Results from this operation in this type of case have been splendid, and photographs show the excellent cosmetic result procured. Of course, other procedures, such as reshaping of the joint surface of the first metatarsal bone, capsuloplasty, and even transplantation of the tendons, may be added.

A variation of the described operation has been worked out for cases in which the first metatarsal bone has become protruded forward which renders reduction of the deformity difficult. In this variant the cuneiform osteotomy is performed on the opposite surface of the first metatarsal; that is, the wedge of bone is removed from the lateral side of the bone down near its proximal end and thus the splayed distal end is more easily brought out to its normal position since the bone is shortened as well as abducted. JOHN W. BRENNAN, M.D.

Bone Lengthening. F. G. ALLAN. *J. Bone Surg.*, 1948, 30-B: 490.

Codivilla described the first bone lengthening operation in 1905. In 1913, Magnuson described his

experimental work on dogs, and reported his performance of 14 such operations. Too rapid distraction on the Hawley table resulted in shock and death of one of the patients.

Abbott, in 1927, described his own method as follows: osteotomy, counter-traction maintained by Steinmann pins above and below osteotomy, tenotomy of tendo achillis, insertion of drill pins, circular division of the periosteum and deep fascia, and the application of distraction apparatus.

Many modifications have since been advocated. Of particular interest, however, are the contraindications issued therefrom. They are (1) loose control of hip and knee joints requiring permanent fixation; (2) age (only adolescents and young adults are suitable patients); (3) lengthening greater than 3 inches; (4) recent joint or bone infection; (5) very tall patients—shortening of long leg preferred.

The technique of lengthening of the tibia is that of an oblique osteotomy without circular stripping of the periosteum or fascia, and transverse osteotomy of the fibula at the same level as of the tibia. Two wires above and below the osteotomy are inserted in the tibia for the purpose of distraction; the latter are tied to Kirschner stirrups which, in turn, are incorporated in the leg cast. Distraction is increased one-sixteenth of an inch a day until the desired length is achieved. Shock with undue pain is attributable to too rapid distraction with harmful tension on nerves, muscles, blood vessels, and fascia, or pressure on the skin overlying bony prominences.

Lengthening of the femur presents greater technical difficulty. Stiffness of the knee joint is a frequent concomitant. The author presents a report of 40 operations for lengthening the shaft of the femur, in which he obtained an average lengthening of 1⅝ inches, with three failures.

Forty-seven other operations were performed on the tibia and fibula in which an average lengthening of 2⅓ inches was obtained, with only one failure.

The average postoperative weight-bearing time was 5 months for the femur, and 6½ months for the tibia. Four and one-third inches was the greatest lengthening achieved by this method. The reaction of bone to the operation was that of delayed union. All bones ultimately recovered their normal radiographic appearances. In 2 cases both leg bones became grossly decalcified.

The reaction of muscle to leg lengthening is adverse to its nutritional integrity, i.e., too rapid lengthening interferes with the blood supply; hence, muscle wasting is inevitable. The lower leg is particularly vulnerable.

The reaction of the blood vessels during the lengthening operation is relatively innocuous. Their inherent elasticity allows considerable elongation in this adolescent group of patients.

The most vulnerable tissue reaction to leg lengthening is discernible in the nerves. Rapid, sustained stretching is invariably associated with transient paralysis of the medial or lateral popliteal nerve. In the author's series the transient paresis of the external or internal popliteal nerve was encountered 19 times, or in about 22 per cent of the patients.

Joint stiffness in a mild form has been observed by the author.

In conclusion, the author states that lengthening of 2 inches in the femur and 3 inches in the tibia can be achieved with relative impunity. Longer lengthening is obtainable with a high risk of transient paresis of the common peroneal nerve. Lengthening of the tibia is more feasible than lengthening of the femur. During traction, lateral rigidity of the bony fragments is of paramount importance. In the opinion of the author, osteotomy is best accomplished by closely spaced drill holes.

SAMUEL L. GOVERNALE, M.D.

FRACTURES AND DISLOCATIONS

Statistical Considerations of 337 Shoulder Dislocations, Including Posterior Luxations and Nerve Complications (Consideraciones estadísticas sobre 337 luxaciones del hombro. Las luxaciones posteriores y las complicaciones nerviosas). JOSE MANUEL DEL SEL. *Rev. ortop. traumat.*, B. Air., 1948, 17: 202.

This article is an analysis of 337 shoulder dislocations attended at the orthopedic department of the Manchester Royal Infirmary. Of the dislocations reported, 8 per cent were of the recurrent type, 19 per cent had associated bone lesions, 1.18 per cent were posteriorly directed, 5.63 per cent sustained nerve complications, and 0.29 per cent disclosed some form of vascular injury. One of every 30 patients with dislocation developed deltoid paralysis. The frequency was approximately equal in both sexes, but showed a tendency to increase with age.

A plea is made for more thorough investigation of the entire shoulder musculature and meticulous testing of the nerves along with their dermatome and cutaneous distributions. It is believed that this alone will obviate any irreparable loss from atrophy or paralysis. STEPHEN A. ZIEMAN, M.D.

Fracture Subluxations of the Shoulder. T. J. FAIRBANK. *J. Bone Surg.*, 1948, 30-B: 454.

Among 115 cases of fracture of the upper end of the humerus, 12 patients were found to have a downward subluxation of the shoulder joint. Of these, 11 patients had fractures of the humeral neck (7 of the abduction type, and 4 of the adduction type), and the twelfth patient had a dislocation with fracture of the greater tuberosity. The ages of the patients varied from 24 to 82 years. In 6 cases, subluxation was present when the patients were first seen; in the other 6, subluxation appeared several days or weeks later. This subluxation may have been due to the violence of the injury, to a weakness of the muscles which retain the humeral head in the glenoid, or to loss of tone in the longitudinal muscles of the scapula. Experimental investigations were carried out on normal shoulders, and dissections and roentgenographic examinations were made in the postmortem room.

It was further shown that:

1. All structures running down the arm from the shoulder, including the vessels and the nerves, play some part in maintaining the stability of the joint.
2. If the whole rotator cuff is divided, the force necessary to subluxate the joint is only slightly diminished.
3. If all of the structures except the supraspinatus are divided, the force necessary to produce subluxation is very small.
4. The glenoid is too thin and pliable to have much of a stabilizing effect.

Experimental effusions into the joint cavity with air and water did not alter the stability of the joint significantly and it was found impossible to maintain any great tension because of the leakage under the subscapularis and down the long head of the biceps. A triangular sling for supporting the elbow prevents subluxation without interference with the fracture. With the aid of physical therapy muscle tone rapidly improves and recurrence is prevented. In cases in which a triangular sling is insufficient, it may be necessary to place the arm in abduction and forward flexion by means of a plaster spica.

RICHARD J. BENNETT, JR., M.D.

Fracture of Hip. R. H. FREYBERG and M. D. LEVY. *J. Am. M. Ass.*, 1948, 137: 1190.

To determine the incidence and type of medical complications in patients with fracture of the hip, a survey of such patients treated at the Hospital for Special Surgery, New York, was made for the 10 years ending December, 1946.

Seventy-two per cent of the patients were women, mostly between 70 and 80 years of age. Significant postmenopausal osteoporosis and obesity were encountered and considered important etiological factors. Twenty-nine patients, or 17 per cent, had significant complications; there was pneumonia in 7 cases with 6 deaths, and pulmonary infarction in 4 patients with 2 deaths.

Pre-existing diabetes, arteriosclerosis, or hypertension did not endanger the patients per se, but would have complicated any superimposed infection or vascular accident. The over-all mortality rate was 7.2 per cent, with most of the deaths occurring in women and in the older patients who were confined to bed.

Prevention of obesity would certainly lower the incidence of hip fracture, and weight reduction should be prophylactically undertaken in all obese older persons. A curtailed caloric intake may be started as soon as the treatment of the fracture is begun. A daily intake of 800-calories is adequate for the bedridden patient and should include from 60 to 80 gm. of protein and plenty of low carbohydrate vegetable "filler."

The osteoporosis in this group of patients is not a disturbance of the calcium and phosphorus metabolism but is due to the insufficient production of osteoid tissue. Prophylactic estrogen or androgen therapy, according to the plan of Albright, is suggested for persons whose osteoporosis is appreciable. Prolonged bed rest is contraindicated.

Pneumonia killed 6 of 7 patients with this complication in this series, but antibiotics were not available in most cases. The second major complication, phlebothrombosis, was more frequent in bed patients than in the postsurgical patients. Anticoagulants were not employed in this group, and might have favorably influenced the outcome.

Immediate care with regard to optimum nutrition, by parenteral administration if necessary, and vigilance against the onset of complications to afford early definitive treatment are the major needs in providing adequate medical care for these patients.

FRANCES E. BRENNECKE, M.D.

Results of Treatment of Fractures of the Hip. H. B. BOYD and I. L. GEORGE. *J. Am. M. Ass.*, 1948, 137: 1196.

Fractures about the hip joint occur in 80 per cent of patients more than 60 years of age and chiefly in women (from 80 to 85%). Trochanteric fractures rarely end in nonunion for the blood supply to both fragments is adequate and much of the bone involved is cancellous. Conversely, fractures of the femoral neck often cause loss of the blood supply to the proximal fragment, and the area does not produce callus in any appreciable amount.

In trochanteric fractures, the authors' mortality was 13 per cent, probably because of the greater trauma involved in the fracture and in its surgical reduction. However, internal fixation with a Neufeld nail is their procedure of choice; this allows the patient early activity and reduces the mortality and the incidence of senile psychosis.

Statistics are offered on a series of 360 central fractures of the femoral neck, of which 177 were followed up for more than a year. All deaths occurring within 4 weeks of operation were included in the mortality rate of 7 per cent. In the 100 patients under 70 years of age, the mortality was 1.0 per cent, but in older patients it rapidly rose to 42.9 per cent in the tenth decade.

Of the 177 patients followed up longer than a year, 150, or 84.7 per cent, obtained union, while 27, or 15.3 per cent suffered nonunion. In 13 of the 27 with nonunion, reduction was inadequate, but in the balance reduction was adequate and nailing was done. The shearing force in more vertical fracture lines is believed to have been adequately counteracted by good internal fixation.

Aseptic necrosis was seen in 32.6 per cent of the unions, and 59.3 per cent of the nonunions. Arthritic changes were markedly increased among the patients who were followed up for 2 years or longer. This included those in which definite collapse of the femoral head occurred in spite of union and disabled the patient as much or more than a nonunion would. Various operative procedures have been devised for the relief of this complication, which now replaces nonunion as a major problem.

FRANCES E. BRENNECKE, M.D.

Fractures of the Acetabulum. MARSHALL R. URIST. *Ann. Surg.*, 1948, 127: 1150.

The author reports on 58 injuries of the hip joint which occurred in jeep accidents. There were 16 cases of fracture of the acetabulum, of which 5 were fractures of the rim of the acetabulum, 3 of the superior and 2 of the posterior rim. There were 8 cases of central fracture and 3 cases of comminuted fracture, which disorganized the entire joint cavity.

It is shown that the posterior rim of the acetabulum is necessary for stability, while the superior shelving portion is vital for weight bearing, but the anterior rim may be excised without seriously altering the function of the joint.

Seven fractures of the acetabulum from the fracture service of the Massachusetts General Hospital were studied. At the end of 2 years, 11 of the 14 military patients had no serious disability. Displacing fractures of the superoposterior rim of the acetabulum appeared to produce more symptoms and disability than fractures of the anterior rim and central fractures. One unreduced fracture of the posterior rim caused severe pain and some limitation of motion, and, on the other hand, one patient whose joint was accurately repaired at open operation had a normal hip. The 3 patients with extensive fractures of the acetabulum and destruction of the joint cavity had ankylosis and complete disability. An open operation through an anterior iliofemoral approach is practicable in very severe cases.

RICHARD J. BENNETT, JR., M.D.

Fractures of the Ankle: Analytic Historical Survey as the Basis of New Experimental, Roentgenologic, and Clinical Investigations. N. LAUGE. *Arch. Surg.*, 1948, 56: 259.

This is a historical survey of ankle fractures stressing the mechanism of fracture, the pathologic anatomy, the characteristic roentgen picture, and the mechanism of reduction—genetic reduction. The subject matter is divided into three chronological periods: the clinical period, experimental period, and roentgenographic period.

Under the clinical period, the author discusses the recognition and treatment of ankle fractures from Hippocrates (about 300 B.C.) to Alexis Boyer (1803). During this period it became increasingly obvious that the fibular fracture is a very frequent, perhaps constant, complication in luxations of the talocrural joint.

Under the experimental period, the author discusses the experiments of G. Dupuytren, Charles Bell, John Howship, Astley Cooper, I.G. Maisonneuve, M.T. Boyer, and others. The chief advancement during this period was recognition of the fact that luxation of the talocrural joint is not only always accompanied by fracture of the lateral malleolus or of the fibula, but also is frequently accompanied by fracture of the medial malleolus and by diastasis between the tibia and fibula; and that several widely different forms of fracture of the ankle exist which, according to experimental surgical investigations, are produced by varying mechanisms. Research on fractures involving the ankle by experimental surgery and autopsy came to a complete standstill with the introduction of roentgenographic diagnosis.

During the roentgenographic period the correctness of the conception formed in the experimental period has been borne out and it has been shown that fractures of the dorsal tip of the tibia are much more frequent than had been suspected; also, that anterolateral fracture of the tibia, and diastasis distally between the tibia and fibula are not at all rare. Attempts are made to develop and improve the methods of treatment gradually as knowledge and understanding of the various forms of fractures are increased, but in spite of the extensive application of roentgen examinations with a view to diagnosing the fractures of the ankle and exploring their nature, the problem is far from having been solved.

From his survey the author concludes that: (1) the exact genesis of most fractures of the ankle is still unknown; (2) the problem of the relationship between the marginal tibial fracture and the malleolar fractures, and between the former and rupture or detachment of syndesmotic ligaments has not been solved; (3) a sure knowledge of rupture or detachment of the ligaments of the syndesmosis in the various types of ankle fractures has not been reached; (4) the criteria of rupture or detachment of syndesmotic ligaments are uncertain; (5) the classification of the malleolar fractures in the literature is almost chaotic; and (6) no attempts have been made to reduce the malleolar fractures in conformity with their actual nature.

In another article the author will present his study of roentgenograms from 229 patients in whom it was shown that it is possible to determine the origin (genesis) of all fractures of the ankle, their pathologic anatomy, and their genetic roentgen diagnosis, and by this means it was ascertained that the types of fractures of the ankle produced by experimental surgery correspond with 99 per cent of the clinical fractures.

JOHN J. CRANLEY, JR., M.D.

ORTHOPEDICS IN GENERAL

Pneumoarthrography of the Knee Joint with Particular Reference to the Semilunar Cartilages. KJELD ANDERSEN. *Acta orthop. scand.*, 1948, Supp. 4.

In this monograph there is a comprehensive section on the history of arthrography and several good ones dealing with methods of joint injection, roentgenographic exposure, and the pathological anatomy of torn semilunar cartilages.

The author gives an account of his experience with 149 patients who were examined by the method of Mohlmann and Madlener; 68 of these patients were submitted to operation. After correlating the arthrographic findings with what was seen at surgery he concludes: "It appears that not only all major changes, bucket handle fractures with dislocation of the torn part, and partial longitudinal tears with dis-

location of the torn part, were demonstrable with considerable accuracy, but the minor changes, total and partial longitudinal tears without dislocation, could also be diagnosed in practically all cases."

H. KELIKIAN, M.D.

The Practical Importance of an Infrequently Occurring Anatomical Continuity between the Tibiofibular Articulation and the Knee Joint (Importanza pratica di una non frequente continuità anatomica fra ginocchio e articolazione tibio-peroneale). *Policlinico*, sez. chir., 1948, 55: 26.

Two patients were operated upon at the Centro Ortopedico e Mutilati of V. Putti in Bologna for apical osteomyelitis involving the leg previously amputated at the upper and lower thirds, respectively. Reamputation was performed in both cases.

In the first patient the fibula was sectioned very high and suppuration spread rapidly from the tibiofibular articulation to the knee joint. In the second patient postoperative recurrent hemorrhage occurred from ulceration of an artery several centimeters above the incision. It was therefore necessary to reopen the wound and subsequently to reamputate at the thigh for an abscess at the head of the fibula.

In both of these instances the anomaly of anatomical continuity between the tibiofibular articulation and the knee joint was found, which in the first patient developed into major clinical significance and in the second, remained an incidental finding.

EDITH B. FARNSWORTH, M.D.

Remarks on the Prognosis of the Posttraumatic Dystrophy of the Extremities. SVEN KIOER. *Acta orthop. scand.*, 1948, 17: 253.

The author's article concerns 25 patients with posttraumatic dystrophy of the extremities, who were treated by sympathectomy. In 22 patients, posttraumatic dystrophy, posttraumatic osteoporosis, or hard edema characterized by pain, limited function, swelling, and joint and skin changes was observed. Of these, 5 patients have recovered completely and permanently, 6 have a partial disability, and 11 will continue to be markedly disabled. Of the remaining 3 patients, with moderate dystrophy, 2 have made a complete recovery.

The author believes that treatment should be instituted early, and he stresses repeated sympathetic block. In the present series of patients, sympathectomy failed; however, these cases were very severe or were of long standing. Ten of the patients presented a "nervous constitution" prior to the occurrence of the accident which was followed by dystrophy.

DANIEL H. LEVINTHAL, M.D.

Chronic Lesions of the Vertebral Column and Accidents of Work (Lesiones crónicas de la columna vertebral y accidentes del trabajo). TEODORO GEBAUER W. *Arch. Soc. cir. hosp.*, Santiago, 1947, 17: 652.

The author reports on 2 cases in which his opinion was requested. In the first, a coal miner, aged 61, was struck on the back by a mass of débris and suffered a fracture of the eleventh thoracic vertebra. Because of persistent pain and kyphosis, an Albee bone graft was inserted but had to be removed 3 months later on account of infection. Twenty-two months after the accident the patient was allowed a 70 per cent disability. The author found a chronic deforming spondylosis of the entire spine.

Spondylosis is due to a pathologic change of the intervertebral discs which, because of constitutional factors or degenerative processes, lose their elasticity and normal height as age increases. A single trauma never causes it, and it is practically a normal manifestation in workmen more than 50 years of age. In vertebral fracture with lesion of the disc, marginal osteophytes usually develop after 4 to 6 weeks, especially on the anterior aspect of the vertebra, and unite two neighboring vertebraelike bridges. These formations are always limited to two or three vertebrae and have nothing to do with spondylosis. A spondylotic spine is more fragile than normal because its resistance is decreased by osteoporosis and loss of elasticity of the discs. Its spondylotic marginal formations may fracture because occasionally they are so close together, on account of the decrease in height of the discs, that they easily touch one another on forced flexion of the spine. Rest, massage, and gymnastics cure most cases by callus formation in 2 or 3 months, but even if a pseudarthrosis forms, healing should not take more than 6 months. Whatever disturbances are then left are due to the chronic deforming spondylosis. To accept or reject an aggravation of a spondylosis by an accident is always a difficult problem for the expert when there are no clear signs of injury. Even when it is certain that the pain and functional disturbances of the spine have appeared for the first time on the occasion of the accident, it is not possible to incriminate the latter for something that had to occur unavoidably in the natural course of the disease. Gaugele has summarized the problem as follows: there is no traumatic spondylosis, whether localized or generalized; deforming spondylosis is the expression of a disease of the discs and not a traumatic change; there is no aggravation of deforming spondylosis by a compensable accident nor by a vertebral fracture.

In the second case, a coal miner also, aged 42, was struck to the ground by a falling mass of coal and was treated with a cast for fracture of the iliac crest and of the first and second lumbar vertebrae. The cast was removed in 4 months. At the end of one year he was allowed 20 per cent incapacity. The author examined him 13.5 months after the accident and found no trace of previous fracture, but a congenital anomaly with six lumbar vertebrae, spondylolisthesis, lateral inclination of the last lumbar vertebra on the base of the sacrum, and scoliosis of small radius with deformation of the vertebral bodies and discs through adaptation, which could occur only during growth.

Spondylolisthesis is caused by an anomaly of vertebral growth at the level of the arches. Once estab-

lished, it results in severe disturbances of the lumbago type which usually appear about the age of 30 and increase with age, and may be associated with disturbances of the sciatic type, caudal symptoms (paresthesias, paresis, paralysis), stiffness of the lumbar spine, inability to do hard work, and a swaying gait. All these disturbances may be minor, slightly developed, or very evident, according to the degree of the disease. The patient is generally a constitutionally weak individual who should not earn his living by hard work like that of a coal miner. The present patient had paresthetic alterations in the lower extremity which were attributed to medullary involvement caused by the accident, but which were exclusively due to his vertebral anomaly that irritated the spinal nerve roots at their exits from the narrowed foramina. RICHARD KEMEL, M.D.

The Value of the Faradocutaneous Sign of Hyperalgesia about the Paravertebral Region (Valore semeiologico della iperalgesia farado-cutanea della regione paravertebrale). VINCENZO NERI. *Chir. org. movim.*, 1947, 31: 72.

The author presents another diagnostic measure that is useful in differentiating spinal lesions. Faradic cutaneous stimulation eliciting hyperalgesia of the corresponding dermatome is employed. Direct manual pressure often gives a negative response and affords no clue as to the underlying pathologic change. The paravertebral area between the nape of the neck and the sacral groove is investigated. Like the rectus abdominis muscles, the erectae spinal muscles manifest metameric innervation by the posterior branches of the spinal nerves. Because of this type of innervation, one can recognize changes in response to the electric current, limited to that section of muscle that is solely innervated by one posterior branch of the spinal nerve.

The cathode is placed in the paravertebral region and slowly moved down the length of the spinal cord, i.e., the vertebral column from the nape of the neck to the sacral area. The potential or quantity of current does not provoke pain. The subjective reaction is one of formication. When the cathode is placed over certain areas which are insensible to pressure sensations, pain is elicited. This pain, however, does not register in the galvanometer reading. The area in which pain is elicited follows the distribution of the nerve as manifested by metameric innervation.

The author refers to many cases in which the afore-mentioned test was of great value. In many cases, the sensation felt by the patient resembled a sudden sharp bite. The zone of hyperalgesia was distinctly limited both superiorly and inferiorly. The dermatome, which was hyperalgesic, corresponded exactly to the specific spinal root. This sign was valuable in the differential diagnosis of lesions of the cauda equina from those of the conus.

The faradic cutaneous hyperesthesia is also of value in early diagnosis of herniation of intervertebral discs, and Pott's disease. In cases of compression, in which the lipiodol does not reveal changes in the spinal canal, this test is also useful.

The author waited for 4 years before he published his results, correlating the operative and roentgenographic results with those found by this method. He controlled the method by proving that once the compression was removed, the area of hyperalgesia disappeared. JOSEPH P. CASCINO, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Tonoscillography After Exercise. BÖRJE EJRUP. *Acta med. scand.*, 1948, 130: Supp. 211.

Tonoscillography is the simultaneous automatic recording of the absolute blood pressure (ton) and the deflections showing the magnitude of the pulsatory pressure variations in the artery of the extremity (oscillography). These latter deflections as observed in the conventional Pachon type of oscillometer are widely used in the examination for peripheral vascular disease. The author's newly designed ink-recording apparatus registers the systolic and diastolic blood pressures on a vertical curve between each tracing of the pulse variation in the vessel. At 30 second intervals the pressure curves fall to zero and follow each other on an endless paper band. A standard type of blood pressure cuff is used at different sites on the extremity. Other types of oscillometers and tonoscillometers are briefly described and discussed.

Oscillometric and oscillographic examinations of the resting extremity have been employed previously in studying peripheral vascular disorders, but "this is the first time that the method has been used routinely on the exercised extremity." Various forms of graded exercises affected the oscillographic curves obtained from both normal individuals (77 cases) and patients with peripheral circulatory disease (660 cases). After exercise the pulsations and blood pressure were increased in the normal extremity and decreased in the extremity with organic occlusive disease.

The significant features of the tonoscillographs are: (1) the change in blood pressure and the type and amplitude of the oscillations; (2) the gradual subsidence of the reaction to exercise; and (3) the length of time of the recovery phase. In all cases with peripheral organic vascular changes the recovery phase exceeded a minute, and in many cases it lasted as long as from 15 to 20 minutes. This recovery phase seemed to be directly proportional to the severity of the total mechanical vascular obstruction. Intermittent claudication is "always attended by vasoconstriction peripheral to the arterial obstruction and is probably passive or secondary to the fall in blood pressure and not due to a special tendency to spasm." This will affect directly the rapidity of the recovery phase. There was no difference in the curves obtained from patients with arteriosclerosis and those with thromboangiitis obliterans. Included in the pathologic material were 38 cases of coarctation of the aorta examined both before and after resection of the coarctation, 5 cases of pseudoxanthoma elasticum, and 9 cases of Raynaud's phenomenon.

The results of exercise oscillography agree with the arteriographically confirmed organic changes in the artery. Other tests used for evaluation of the peripheral circulation were measurement of skin temperatures after heating of the body, after reactive hyperemia, following injections of tetra-ethylammonium bromide, after local blocking of the lumbar sympathetic chain or spinal anesthesia, and the determination of circulation time with fluorescein. From this exhaustive study of 3,000 oscillographic examinations the author concludes that "tonoscillography after exercise" is a " new method for early diagnosis of organic disease leading to intermittent claudication and for differential diagnosis of organic and functional arterial disease."

This translated monograph of almost 300 pages is well written and the material is well organized and indexed. An extensive reference bibliography, many graphs, tables, and case reports are used throughout the text. The report is exceptionally complete. For clinical application it is doubtful whether the results of tonoscillographic studies of peripheral vascular disease, which require expensive special apparatus, are of greater value than the results obtained by experienced examination with more simple conventional oscillometric and other tests which are used today.

FRANK V. THEIS, M.D.

BLOOD; TRANSFUSION

Hemolytic Transfusion Reactions. MORRIS J. NICHOLSON. *Anesthesiology*, 1948, 9: 345.

The development of blood banks has made the use of whole (citrated) blood transfusions a rather commonplace hospital procedure. And, as indicated by the author, although a compatible transfusion may often be lifesaving, an incompatible one may cause death. The purpose of this article is to review the etiology, signs, symptoms, prognosis, and treatment of hemolytic transfusion reactions, and present the experience of the Lahey Clinic with 3 such reactions. In Table I the author states the common indications for transfusion.

Although many errors related to grouping and cross-matching of the donor and recipient can be made, which result in the patient's receiving incompatible blood, in the author's experience clerical

TABLE I.—INDICATIONS FOR TRANSFUSIONS

1. Increase oxygen-carrying capacity, hemorrhage, anemia, poisonings
2. Restore blood volume in prevention or treatment of shock
3. Restore clotting mechanism to normal
   - A. Hypoprothrominemia
   - B. Hemophilia
   - C. Platelets and other blood clotting elements
4. Correct hypoproteinemia, liver disease, nephritis, ulcerative colitis, carcinoma of stomach
5. Supply immune bodies in treatment of infectious diseases, septicemia, bacteremia, puerperal sepsis

TABLE II.—SOURCE OF ERROR IN BLOOD TRANSFUSIONS

I. Errors in grouping and cross matching
  A. False negative reactions—weak typing sera
    1. Low titer from outset
    2. Deterioration from improper storage
    3. Deterioration from bacterial contamination
  B. False positive reactions
    1. Pseudo-agglutination (rouleaux formation)
    2. Auto-agglutination
      a. Cold agglutinins act on all bloods
      b. Warm agglutinins
    3. Iso-agglutination—cold iso-agglutinins act only on certain blood
II. Clerical errors in handling of blood at bank
  A. Incorrect labeling of pilot tube
  B. Wrong blood released from bank
  C. Mix-up in administering blood to patients

errors have caused the greatest number of hemolytic transfusion reactions. Table II lists the sources of error that one is apt to encounter in the administration of blood transfusions.

A conscious patient who receives incompatible blood may show subjective signs and symptoms almost immediately, or the reaction may be delayed and the initial manifestations develop several hours after completion of the transfusion. When incompatible blood is given to a patient under general anesthesia, however, there are no signs and symptoms to indicate what has happened unless by chance one should examine the urine and discover it to contain precipitated hemoglobin. In Table III the author classifies the various types of transfusion reactions.

Once it is established that the reaction is caused by the recipient's having received incompatible blood, vigorous treatment should be started at once. The author lays particular emphasis upon the fact that a preconceived plan of investigation should be immediately invoked, to afford early diagnosis and prompt treatment.

Although urinary alkalinization has not proved a panacea, the author favors its immediate institution

TABLE III.—CLASSIFICATION OF TRANSFUSION REACTIONS

I. Physical and chemical reactions
  A. Chemical
    1. Foreign material in apparatus
    2. Pyrogens
    3. Coagulative changes in transfused blood
  B. Physical
    1. Rapid administration of cold blood
    2. Air embolism
    3. Pulmonary edema from too rapid administration
II. Allergic or urticarial reaction
III. Hemolytic reactions (intravascular agglutination and hemolysis)
  A. Intra-group type
    1. Rh factor
    2. "Cold" hemagglutinins { cirrhosis of liver; acute infectious—virus pneumonia, paroxysmal cold hemoglobinuria }
  B. Gross incompatibility
  C. Dangerous "universal" group "O" donor
IV. Transmission of disease—malaria, syphilis, infectious hepatitis

by the administration of sodium bicarbonate or potassium citrate orally, or sodium bicarbonate, sodium racemic lactate, or sodium citrate intravenously. The fluid balance should be carefully watched, and the retransfusion of compatible blood is important to counteract the severe hemolytic anemia associated with these reactions.

A new mode of treatment making use of A and B group specific substances to neutralize the alpha and beta agglutinins is discussed. If applied within the first few hours it may prove to be a most beneficial therapeutic endeavor.

Three cases of hemolytic transfusion reaction with anuria and hemoglobinuria are reported by the author. Two patients died and the third recovered. In the latter case 40 c.c. of Witebsky's A and B specific substances were given intravenously in addition to the usual therapeutic measures.

EDWARD F. LEWISON, M.D.

SURGICAL TECHNIQUE

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Infections of the Hand. J. B. Loudon, J. D. Miniero, and J. C. Scott. *J. Bone Surg.*, 1948, 30-B: 409.

The authors present a study of 723 patients with infections of the hand, who attended the Casualty Department of Radcliffe Infirmary, Oxford, England. Their cases have been classified in accordance with the anatomical structures and spaces of the hand, and attention is called to the economic importance of infections of the hand and the high loss of man-hours.

All infections of the fingers and hand have been classified according to the degree of infection. Infections of first degree presented throbbing and tenderness; second degree infections presented more marked pain, redness, swelling, heat, tenderness, and fluctuation; third degree infections presented pain, redness, swelling, fluctuation, heat, tenderness, and devitalized skin; fourth degree infections presented "the discharging hand"; pain was not so marked but sinus was present.

In 50 per cent of a series of 69 cases, no history of injury was given and it was deduced that the localized infection was blood-borne. This conclusion seems most speculative since it is well known that small unnoticed abrasions of the hand are the most common progenators of serious infections to follow.

The authors present a short description of the bacteriology and pathology of infections of the hand. They have also given an outline of the aims of treatment and the methods employed. Principles of treatment are based upon (1) the evacuation of pus, (2) excision of necrotic tissue, (3) primary suture of the wound whenever possible, and, in cases in which immediate skin coverage is not possible, early skin grafting. The operation is performed in a bloodless field. Dressings are changed infrequently, and the involved part is immobilized in plaster. Two diagrams are presented—one showing incisions in relation to skin creases, the other showing incisions in relation to the underlying structures. These incisions, with the exception of incisions for drainage of a thenar space abscess, are essentially the same as those described by other authors. The preoperative, operative, and postoperative treatment are discussed as well as some of the individual cases, with photographs taken before and after surgery.

Emphasis is placed upon the well recognized benefit of rest of the involved parts by complete immobilization. In all instances, appropriate amounts of penicillin was given. The various stages of acute tenosynovitis are discussed, and methods of treatment are described. In Table 3, the authors show the average time of healing of pulp space infections, distal palmar pulp infections, tendon sheath infections, and paronychia.

The closure of infected wounds, after excision of necrotic and nonviable tissue, is a radical departure from accepted surgical measures. This method of treatment of infections of the hand is believed to be radical and fraught with danger in the hands of the casual operator. Morris J. Dirstine, M.D.

Streptomycin in Surgical Infections—Infections of Soft Tissues. Edwin J. Pulaski, Frank W. Spicer, Jr., and Melvin J. Johnson. *Ann. Surg.*, 1948, 128: 46.

This report, the fifth of a series dealing with the streptomycin therapy of surgical infections in United States Army hospitals, is concerned with the results of this form of antibiotic therapy in infections of the soft tissues. Included in this report are 67 cases of cellulitis, 33 of which were associated with abscess formation, 30 cases of localized infection, and 5 cases of specialized infection. Sixty-eight of the 102 patients were treated with streptomycin alone and 34 were treated with a combination of streptomycin and other bacteriostatic agents. Gram-positive cocci were the dominant organisms in 61 of the 102 cases. The Staphylococcus aureus and hemolytic streptococci were found in pure culture alone or in combination in 20 cases, and gram-negative bacilli were cultured alone in 16 cases. Mixed infections were present in 20 cases. Streptomycin was the only antibacterial agent employed in the treatment of 68 cases, the results being classified as good in 47, doubtful in 7, and poor in 14. The results in 34 cases treated with streptomycin in combination with penicillin or sulfadiazine, or both, were good in 14 cases, doubtful in 4, and poor in 16. No reaction to streptomycin occurred in patients receiving less than 2 gm. of the drug daily, and only 8 of the 61 treated patients had minor undesirable effects of dizziness, nausea, or vertigo when this dose was exceeded.

The authors state that good results cannot be expected from streptomycin therapy unless certain conditions are met: the organism or organisms responsible for the infection must be streptomycin-sensitive; the drug must be given in adequate dosages; there must be little or no necrotic tissue present; and the blood supply to the affected site must be adequate. The cases in this series in which poor results followed streptomycin therapy were almost without exception cases in which these principles laid down by the authors were violated. Streptomycin apparently has its chief field of usefulness in acute infections complicated by cellulitis. It also has a field of usefulness in the therapy of acute gram-positive coccal cellulitides which are penicillin-resistant, in which the patient has developed a penicillin-sensitivity reaction, or in mixed infections in which the response to penicillin alone is not satisfactory because some organisms present are not penicillin-sensitive. Streptomycin applied topically gave indiffer-

ent results, and it is concluded that if local wound suppuration is not completely controlled within 72 hours after the topical application of streptomycin is begun, the effect is probably not bacteriostatic. When streptomycin is used it must be given in adequate dosage. The optimal dose when it is used alone is from 2 to 3 gm. daily, the duration of treatment depending on the response. If treatment is discontinued too soon after a favorable response is apparent, recurrence is likely. On the other hand, if therapy must be continued longer than 14 days, the dosage should be reduced to avoid the risk of labyrinthine disturbances. The optimum dosage of streptomycin in combination with penicillin has not been worked out yet, but from present indications it will be considerably less than 2 to 3 gm. daily, now regarded as optimum when streptomycin is used alone.

EDMUND A. GORVETT, M.D.

ANESTHESIA

Sacrococcygeal Epidural Anesthesia in Obstetrical Practice (L'anesthésie épidurale sacrococcygienne dans la pratique obstétricale). HENRIE DIEUDONNE. *Anesthésie*, Par., 1947, 6: 166.

In succession, the author discusses the history of sacral anesthesia, its field of application, principle of action, technique, physiological action, and the indications and contraindications to its use.

The principle of epidural anesthesia consists of a physiological interruption of nerve impulses conducted by the sacral nerves which innervate the soft tissues involved, i.e., the perineum, vulva, vagina, and the ischiorectal fossae. By its application there is obtained an analgesia of the anus, rectum, and urethra, as well as the parts above mentioned. The uterine body seems to escape anesthesia, while anesthesia of the cervix is not constant.

The technique employed by the author is as follows: with the use of a blunt needle and with trocar in place, a puncture is made through the sacrococcygeal hiatus in the usual manner. The trocar is then withdrawn and a ureteral catheter, the same caliber as that of the trocar, is introduced through the lumen of the needle and cautiously slipped into place. The distal end of the catheter is transfixed to the skin with adhesive tape. By means of a syringe led into the outer end of the catheter, 25 c.c. of 1.5 per cent procaine is injected. The syringe is then replaced by a graduated container holding from 20 to 30 c.c. of the same anesthetic, which is allowed to flow into the catheter drop by drop as needed.

The physiologic effect of the anesthetic occurs in from 20 to 30 minutes from the time of the injection and lasts from 1½ to 2 hours. Two actions are produced. The first of these is a constant action produced on the anus, vulva, perineum, and vagina, which is evidenced by a state of anesthesia, relaxation, and decrease in tonicity of these parts. A less constant action produced is that of anesthesia of the vault of the vagina, the cervix, and sometimes the body of the uterus.

The action on the uterine contractions in some cases is very marked, the amplitude is often greatly diminished, the rhythm less frequent, and the contractions may sometimes entirely cease. In some cases the cessation of uterine contractions has been accompanied by varying degrees of uterine hemorrhage.

Action on the perineum is shown by an easy dilatation of the vulvovaginal canal, which lessens the chance of perineal tears in cases in which the application of forceps is indicated.

With anesthesia of the perineum already obtained, it is easy to suture perineal tears which may have occurred.

The author mentions several causes of failure to obtain epidural anesthesia. Failure to locate the sacrococcygeal hiatus may be due to the presence of an abnormal amount of subcutaneous fat in obese patients; to a deformity of the sacrum or the sacral canal, as in spina bifida; to partial or total ossification of the membrane of Cathelin; or to a deformity of the upper end of the coccyx. Technical failure will result when the needle has not been introduced into the right place.

This type of anesthesia is indicated in cases of abnormal delivery, such as breech delivery in primiparas in whom versions or other operative maneuvers are indicated; proper relaxation of the soft tissues is afforded in such cases. It is indicated in cases in which spinal anesthesia is contraindicated, as in cardiac and pulmonary complications, or in long drawn-out deliveries in which general anesthesia would prove fatal.

When epidural anesthesia retards labor by reducing uterine contractions, pituitary injections may be given to obviate the difficulty.

The length of time which elapses between the injection of the anesthetic and the attainment of satisfactory anesthesia contraindicates its use in those cases in which prompt anesthesia is demanded, as, for example, where danger to the life of the fetus exists.

BLACKWELL MARKHAM, M.D.

One Year's Experience with Intravenous Procaine. DAVID J. GRAUBARD, R. W. ROBERTAZZI, AND MILTON C. PETERSON. *Current Res. Anesth.*, 1948, 27: 222.

The authors report further on the clinical use of the intravenous administration of procaine for the relief of pain in 448 instances of traumatic, inflammatory, and various other disease entities. The solution was prepared as a 0.1 per cent solution of procaine hydrochloride in isotonic saline solution to which has been added 1 gram of sodium ascorbate per 1,000 c.c. of solution. The average patient was observed to tolerate procaine better when given intravenously with vitamin C. A standard dosage of 4 mgm. of procaine per kilogram of body weight in 20 minutes was used for each infusion.

The signs and symptoms observed during the intravenous administration of procaine were a sensation of warmth throughout the body sometimes ac-

companied by a flush over the head, face, and neck, and followed by dryness of the mouth, a metallic taste, lacrimation, dilatation of the pupils, and lightheadedness. Increasing the rate of flow or the concentration of procaine resulted in the manifestation of apprehension, dizziness, the sensation of trembling, and sleepiness.

The types of cases in which this procedure was used as an adjuvant to management are briefly summarized. Uniformly good results were obtained in relieving the pain of trauma except in cases of herniated intervertebral disc and in cases of myalgia of the upper extremities or of the shoulder girdle. In general, the inflammatory conditions responded well except for lack of benefit in 7 cases of tic douloureux. Other conditions, including malignant disease and multiple sclerosis, varied considerably in response to the intravenous administration of procaine. However, one case of established Parkinson's disease is reported with almost complete absence of tremors after 6 infusions over a 3 week period.

MARY KARP, M.D.

_d_-Tubocurarine Chloride. T. CECIL GRAY. *Proc. R. Soc. M.*, Lond., 1948, 41: 559.

The article is a critical appraisal of *d*-tubocurarine chloride in the light of 3 years' experience with its use in anesthesia. This is one of the least toxic drugs used in anesthesia as the heart, liver, and the kidneys are unaffected by it. Nevertheless, it is potentially one of the most dangerous. Any dose likely to be of service to the anesthetist will affect the respiratory muscles to some extent.

Certain points of technique are stressed. First and most important is the necessity to aid or assist respiration when *d*-tubocurarine has been given. A preliminary small dose as a test is strongly advocated. Intubation is carried out frequently to obviate the hazard of regurgitation of the stomach contents and to prevent inflation of the stomach.

It is the clinical impression that patients who have been anesthetized with the help of *d*-tubocurarine suffer less from shock than those who are subjected to deep or moderately deep anesthesia. The good postoperative condition of the majority of these patients is accounted for by the fact that their vasomotor compensatory mechanisms are still active after a light anesthesia.

The author believes that *d*-tubocurarine is not the final answer, but the absolute certainty of the results, its comparative nontoxicity, and the ease of anesthesia in which it is used are factors which indicate a most significant step in management.

MARY FRANCES POE, M.D.

The Vasodilating Action of Some Local Anesthetics. R. BEUTNER. *Current Res. Anesth.*, 1948, 27: 197.

The author discusses the fall of the blood pressure in spinal anesthesia. Fourteen dogs were studied, the blood pressure being registered in the usual way, through a cannula inserted in the carotid and connected with a mercury manometer registered on a smoked drum. A dose of from 5 to 10 mgm. per kilogram of procaine was injected intravenously and the effects were noted.

The results demonstrated that the fall of the blood pressure is the result of vasodilatation which manifests itself in the free bleeding of the procaine-injected areas following incisions or trauma. In an attempt to study the clinical structure with regard to this vasodilatation effect a number of other local anesthetics were studied and varying doses of these drugs were injected intravenously.

According to the observations made, nearly all local anesthetics were found to lower the blood pressure by peripheral vasodilatation. The degree of this dilatation varied according to the chemical structure of these drugs without relation to their anesthetic potency. Intracaine was found to lower the blood pressure most, monocaine the least, and procaine and apothesine lowered it to a middle position. Cocaine was found to be the only local anesthetic which in no case produced a fall in the blood pressure. In no instance was a material change in the rate or stroke volume of the heart observed; thus, the presence of cardiac depression was not considered the cause of a lower blood pressure.

MARY KARP, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

The General Theory of Stratigraphy (Teoria generale della stratigrafia). ALDO PERUSSIA AND CARLO BROGGI. *Radiol. med.*, Milano, 1948, 34: 449.

The characteristics of various modalities of stratigraphic examinations depend entirely on the theoretical study of the involved geometric problems.

The authors attempted to express in geometric terms the optimal relations between the focus, the object, and the film. The various modalities of the stratigraphic method may be reduced to a single geometric formula which has been developed by the authors.

The stratigraphic method is especially adaptable to the study of the cranium, facial bones, the larynx, and the chest.

The question arises: Is it possible by a proper selection of the position of the focus-object-film to visualize a single layer of the object? In geometric terms the same question could be formulated as follows: What relations should there be between the focus and the film to retain the projection of the focus on the film during the movements of the system? It is this question that the authors attempted to answer by developing their geometric formula.

JOSEPH K. NARAT, M.D.

Two Cases of Vertebra Eburnea of Apparently Primary Origin (Due casi de vertebra eburnea apparentemente primitiva). GIANCARLO LISCHI. *Radiol. med.*, Milano, 1948, 34: 385.

The term "vertebra eburnea" is applied to a sclerotic process involving chiefly the body of the vertebrae and producing a variety of symptoms. Three groups of the lesion may be differentiated:

1. Opaque vertebrae of neoplastic origin. In descending order of frequency the following tumors may produce osteoplastic metastases: carcinoma of the prostatic gland, epithelioma of the breast, especially the scirrhous cancer of the stomach or the colon, hypernephroma, and primary osteoblastic sarcoma of the spine. A contiguity of a neoplastic process may produce an opaque vertebra.

2. Opaque vertebrae caused by local or general pathologic conditions such as malignant lymphogranulomatosis, Paget's disease, blood diseases with osteosclerosis, syphilitic spondylitis, tuberculous spondylitis, streptostaphylococcal osteomyelitis, and Kuemmell-Verneuil's syndrome.

3. Opaque vertebrae which apparently have no relation to any other pathologic process.

Two cases belonging to the last group are reported by the author. The first patient, a woman 58 years of age, was admitted with complaints of pains in the right upper quadrant of the abdomen. An eburnation of the first lumbar vertebra was found in addition to spondylarthrosis of the second and third lumbar vertebrae. The rarity of opaque vertebrae, on one hand, and the great frequency of arthritic conditions of the spine, on the other, made relations between both conditions highly improbable.

Some nutritional disturbances affecting the calcium and phosphorus metabolism, avitaminosis, or some toxic factors of exogenous or endogenous origin could have been responsible for the condition.

In the second patient, a woman aged 49, eburnation of the second lumbar vertebra was discovered in roentgenograms. The patient stated that she developed a sudden intensive pain in the lumbar region during parturition which took place 15 years prior to her admission to the hospital. Possibly the trauma caused a reflex in the sympathetic system with resulting vasodilatation and modifications of the local nutritional conditions.

JOSEPH K. NARAT, M.D.

Some Considerations in the Treatment of Hemangioma in Infants and Young Children. EUGENE P. PENDERGRASS, JAMES C. KATTERJOHN, AND JAMES B. BUTCHART. *Am. J. Roentg.*, 1948, 60: 182.

The authors present their experience since 1938 in the treatment of 560 hemangiomas in 406 patients. The lesions had a wide distribution in location over the bodies of the patients.

Hemangioma of the skin or mucous membrane is a lesion familiar to every doctor. Whatever treatment is given should be early, that is, as soon after birth as possible or as soon as the blemish appears. A hemangioma is a localized hyperplasia of the cutaneous or subcutaneous vascular tissue. It varies in size and color. Vascular nevi may be separated on an anatomic basis into three groups: (1) flat or slightly elevated tumors composed of a superficial plexus of dilated capillaries, angioma simplex, nevus flammeus, and port wine stain; (2) hypertrophic angiomas, made up of an interlacing network of blood vessels of considerable size—angioma plexiforme and angioma simplex hyperplasticum; and cavernous hemangiomas.

The technique employed may be divided into two parts; control of the superficial or dermal elements by roentgen therapy as the first part, and control of the deeper portions of the lesion by implantation of radon seeds or use of intermediate voltage therapy. The treatment is given over a period of months. When lesions occur on the scalp, around the eyes, or in the region of the epiphyseal center of a bone, the family is advised about the possibility of damage to these structures. For small lesions located either around the eye, the lips, the nose, or the labia, the authors prefer to use the Phillips unit using 44 kv. In every other situation the Chaoul apparatus using 45 kv. is preferred. The number of portals used depends on the size of the lesion and its shape. The skin target distance depends upon the depth of the

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lesion. In port-wine stains, the Phillips unit with 1.9 cm. distance is used. In the deeper or thicker lesions from 3 to 5 cm. skin target distance is used with the Chaoul unit.

Intermediate voltage from 75 to 135 kv. is used in the instances in which the lesion is large and bulky. Most of the small and deep-seated hemangiomas are treated with radon after skin discoloration has been removed by roentgen therapy. With intermediate voltage, from 1 to 3 mm. of aluminum filtration with a half-value layer of from 2.4 to 4.6 mm. of aluminum is used; the filtration of the radiation with the Phillips and Chaoul units ranges from unfiltered to 0.2 mm. of nickel. The half-value layer of the radiation is 2.4 mm. of aluminum with the Chaoul apparatus, and 0.3 mm. of aluminum with the Phillips unit at contact. The lesion is given from 200 to 400 roentgens (as measured in air) through as many portals as are required to cover it. The portals do not overlap. The patients are seen at intervals of 4 to 6 weeks. Usually from 3 to 7 treatments are required and usually less than 1,500 roentgens are given. Seventy-five per cent of the patients treated with the Chaoul apparatus receive less than 1,250 roentgens and 95 per cent receive less than 1,750 roentgens, the treatment time extending over a period of 18 months. The most deeply situated portions of the lesions are treated with implantation of radon seeds of from 0.1 to 0.5 mc. of strength through multiple portals. In general, all lesions respond well if treated early. FRANK L. HUSSEY, M.D.

Statistical, Pathogenetic, and Clinical Considerations on Radionecrosis of the Mandibular Bone (Considerazioni statistiche, patogenetiche a cliniche sulla osteoradionecrosi mandibolare). FRANCO PEROTTI. *Radiol. med.*, Milano, 1948, 34: 321.

This study is based on 48 cases of bone necrosis observed among 152 oral carcinomas which were more or less connected with the mandibular gum, were treated at the Institute of Radiology of the University of Milan, and had been followed up for a considerable period. The bone necrosis usually sets in suddenly months or years after radiotherapy, is manifested clinically by severe pains, and is often preceded, sometimes accompanied or followed, by necrosis of the overlying soft tissues. It results in the formation of sequestra which are eliminated spontaneously or removed surgically The course is prolonged for months and healing begins only after elimination of the sequestra. Some authors attribute the bone necrosis to the direct action of the rays on the living cells of the bone, but most authors believe in a vascular pathogenesis in which the rays produce changes in the vessels of the bone or in those of the overlying periosteum and mucosa. Of the 48 cases, 38.5 per cent occurred between the ages of 40 and 70, and 65 per cent after the age of 70.

Two treatment methods were used: the first consisted of intraoral radium therapy followed by the removal of involved lymph nodes and the application of an external radium apparatus providing from 30 to 40 U. D.; the second consisted of intraoral radium therapy only.

Bone necrosis occurs rarely when the calculated dose remains below 1.4 destroyed millicuries per square centimeter (with or without external apparatus), but appears suddenly and frequently when this dose is exceeded; it occurs with about equal frequency with or without an external apparatus when the dose is between 1.4 and 2 mc. per square centimeter, and it occurs constantly when the dose approaches 3 mc.

Eight cases were preceded by tooth extraction in the involved zone from 25 days to 12 months previously; in 2 of these cases the extraction was done for extraneous reasons and was soon followed by bone necrosis; in the other cases the chronologic relationship was rather close and the interval was marked by local dystrophic or inflammatory phenomena which gave the impression of a cause and effect connection. These patients had been given medium doses and one had received a particularly low dose. Twenty-seven cases were preceded by necrosis of the overlying gum often denuding the bone; the patients had received an average dose of 1.7 mc. Of the remaining 21 cases, 5 were preceded by dental extraction, and 4 by inflammatory phenomena with fistula formation; in 12 the necrosis of the mucosa was present at the time of elimination or removal of the sequestrum; the patients had received an average dose of 1.5 mc.

It is to be noted that bone necrosis has occurred 5 or 6 times less frequently when treatment consisted only of the application of an intraoral apparatus instead of the introduction of radium needles. This may be due to the fact that the needles are closer to the periosteum or produce more mechanical damage to the gingivoperiosteal vessels.

The following conclusions appear to be justified. The medium global dose of radium exerts a marked influence on the incidence of bone necrosis which is rare when the dose is below 1.4 mc., more frequent when the dose exceeds 1.4 mc., and exceedingly frequent when the dose approaches 3 mc. Needles inserted close to the surface of the bone, especially those of high potency, seem to exert a marked damaging effect on the vitality of the bone. The adjunction of an external radium carrying apparatus, usually submandibular, does not seem to influence the incidence of bone necrosis. RICHARD KEMEL, M.D.

Laryngeal Chondronecrosis Following Roentgen Therapy. WILLIAM A. GOODRICH and MAURICE LENZ. *Am. J. Roentg.*, 1948, 60: 22.

Healthy laryngeal cartilage is protected by a normal mucosa, and the perichondrium will withstand infection with moderate fractionated x-ray dosage. However, when adult cartilage is infected or traumatized, extensive necrosis and sequestration may occur. Chondronecrosis is rather rare in small or early carcinoma. It is more common in advanced or extensive growths, for the tumor invades the adjacent tissue and obstructs the venous and lymphatic capillary flow, thereby causing mucosal edema. The edematous mucosa tends to ulcerate and affords

access of bacteria into deeper tissues. As a result of this spreading infection, the perichondrium becomes involved with involvement of the cartilage. Such a process may occur with or without x-ray therapy, according to the extent of the lesion.

From 1932 to 1946, 205 cases of laryngeal tumors were studied. There were 28 cases of laryngeal necrosis. The chondronecrosis was dependent upon the following factors: (1) the time interval between the last x-ray treatment and the recurrence of the necrosis; (2) the site and extent of the involvement of the tumor; and (3) any previous surgery, such as laryngectomy, that has been done prior to the x-ray therapy.

Chondronecrosis, in the majority of cases (23), was observed within 6 months from the time of treatment if finished. Seventeen patients showed a fixation of the arytenoids, which suggested that these may have been the initial site of the chondronecrosis. Thyroid cartilage necrosis did not appear to be the initial site in the present series of cases. Chondronecrosis was slightly more severe in the cases in which the epiglottis was involved. Most cases of cured cancer of the epiglottis showed a definite deformity of the cartilage which indicated a healed area of chondronecrosis. In the series of 25 patients with carcinoma of the epiglottis which had been treated, 6 developed a marked necrosis of the cartilage.

The extensiveness of the lesion has a definite influence on the tumor. Chondronecrosis was observed in 16 cases in which the arytenoids were fixed. In 2 of 7 cases with laryngeal fissure, chondronecrosis developed. There was 1 case in which hemilaryngectomy was done 2 weeks after a tumor dose of 7,800 roentgens was given. The removed portion of the larynx showed only radiation reaction without evidence of necrosis or persistent carcinoma. However, after the operation chondronecrosis developed promptly in the remaining portion of the larynx. The second patient was subjected to partial bilateral removal of the thyroid cartilage before x-ray therapy and developed a chondronecrosis of the remainder of the cartilage.

Laryngeal edema was apt to occur when larger fields, a daily dose, and a shorter period of treatment were used. The dosage given to the 28 patients who developed chondronecrosis was as follows: 14 received a tumor dose of from 5,500 to 6,000 roentgens, and 10 were given a tumor dose of from 6,000 to 7,000 roentgens. The average effective tumor dose was between 5,500 and 8,000 roentgens. The treatment time in the majority of cases ranged from 35 to 45 days, and the daily dose from 100 to 150 roentgens, which was given to two opposing laryngeal fields. In several cases in which there was marked edema prior to therapy, the dosage was lowered to 50 roentgens and the size of the field was cut to about 6 by 8 cm. Patients with laryngeal carcinoma were generally given from 6,000 to 7,000 roentgens in air in a 6 week period to two lateral fields, directed somewhat obliquely toward the larynx. Central overlapping of radiation was avoided with a 1 cm. lead strip; a 200 kv. unit was used; 100 roentgens were given to each side, the fields being 5 by 8 cm. each. If cervical nodes were present, they were treated separately.

Reactions during the course of treatment varied. Treatment was usually interrupted between 1,400 and 1,800 roentgens to each of 2 fields if a pseudodiphtheric membrane developed, and was resumed after several days when the inflammation began to subside. The treatment was carried to completion if the initial membrane did not develop until 2,500 roentgens had been given to each field; i.e., approximately 3,000 roentgens to each field. Sometimes treatment had to be interrupted to allow the edema to subside, and in some cases tracheotomy was done before treatment. In such instances the daily dose was much smaller, generally between 50 and 75 roentgens.

The prognosis of chondronecrosis of the free portion of the epiglottis is much more favorable than that of the rest of the laryngeal cartilages, for any necrosis of the former portion can readily be expectorated. Arytenoid chondronecrosis has a bad prognosis with an upward drainage of infection and necrosis.

Chondronecrosis can be prevented to some extent by the extensive use of chemotherapy. In several instances of extensive carcinoma with marked infection, chondronecrosis was prevented by the oral use of penicillin for several weeks prior to the treatment. It is quite possible that the Arbuckle procedure (total removal of the cartilage by laryngectomy) would be helpful. MAURICE D. SACHS, M.D.

Radiology of the Persistent Thyroglossal Duct (Zur Roentgenologie des Ductus thyreoglossus persistens). W. GUNTERT. *Acta radiol.*, Stockh., 1948, 29: 343.

The author reviews the embryology and anatomy of the thyroglossal duct, discussing at length the development of the four main types: (1) incomplete duct with fistula communicating with the foramen cecum; (2) incomplete duct with exterior fistulous communication; (3) a complete median tract, with or without cystic formation; and (4) a cyst in a blind remnant of duct with neither exterior nor interior communication.

The roentgenologic diagnosis of these conditions is discussed; a differential diagnostic list is included and throughout the entire discussion an excellent list of references is given. Four case histories are given as diagnostic problems for roentgen study. The following suggestions are made regarding the diagnostic technique:

There are a large number of radiopaque media which can be used for injection into the tract, usually by means of a cannula, among which are barium, bismuth, sodium iodide, sodium bromide, and the newer substances, thorotrast and iodized oil. None of these contrast media are completely satisfactory at all times. When there is a complete median tract a more viscose medium must be used to prevent spilling out as quickly as it is injected. The site of injection

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varies with the type of the persistent structure. In an incomplete inner fistula, an injection of medium can be done through the foramen cecum. This is best done under pressure with a cannula because sometimes the fistula ends in a blind cyst filled with cholesterol crystals. Injection into an incomplete outer fistula is more simple and is done under some pressure to outline a terminal cyst. It is difficult to outline the complete median tract which is patent at both ends. One way of doing this is to inject from the exterior aspect sufficient medium to fill the tract and cyst, if present, so that the medium escapes through the foramen cecum. The patient will state that there is something in his throat at this point and a roentgenogram taken at the same time should show a completely filled tract. In the cases of cysts with neither outer nor inner fistulous opening, a puncture is made in the midline with a sharp needle which is left in place after the injection and a roentgenogram is taken to check the actual filling of the cyst. One reference is given to x-ray and radium treatment of the thyroglossal duct. JANE C. MACMILLAN, M.D.

Angiocardiography in the Diagnosis of Congenital Heart Disease. K. D. KEELE. *Brit. J. Radiol.*, 1948, 21: 380.

The importance of accurate diagnosis in congenital heart disease has of recent years increased with the advent of surgical methods of treatment. Angiocardiography provides a method whereby this necessary accuracy may be obtained. In the present article, acyanotic congenital heart disease only is discussed, since it is considered that this group of cases presents most commonly the diagnostic difficulty in relation to surgical treatment.

The technique is outlined briefly. After preliminary sensitization tests, the child is anesthetized with cyclopropane and oxygen by means of an intratracheal tube.

The patient is placed on a cassette tunnel in the anterior oblique position. A vein in the left antecubital fossa is dissected out and a large cannula is inserted. After a preliminary film, from 15 to 20 c.c. of 70 per cent pyelosil is introduced within 2 seconds into the vein. Eight films are exposed in rapid succession in the next 12 seconds. Normal saline is infused through the cannula for the 15 to 20 minute period to aid in excreting the contrast agent. The procedure is repeated with the patient in the anteroposterior position. Films are taken at 65 kilovolts, 200 milliamperes, and 1/20th second exposure.

The author presents the findings in a normal angiocardiogram. He also reports 5 cases of children presenting abnormal angiocardiograms, coarctation of the aorta, patent ductus arteriosus with complete heart block, patent ductus arteriosus with pulmonary stenosis, patent ductus arteriosus with patent interauricular septum and patent interventricular septum.

It is believed that angiocardiography should be used in any case of congenital heart disease in which operation is being considered, since it may provide proof of the suspected lesion and also reveal other lesions. FRANK L. HUSSEY, M.D.

Radiation Therapy of Malignant Tumors of the Testis. T. LEUCUTIA, WILLIAM A. EVANS, JR., and JAMES C. COOK. *Radiology*, 1948, 51: 177.

Review of the literature indicates the incidence of neoplasms of the testis to be between 0.5 and 1.5 per cent of all malignant neoplasms. The authors present a statistical analysis of the factors influencing the survival rate in 110 cases of malignant tumors of the testis observed at Harper Hospital, Detroit, from 1923 to 1947. The patients were in most instances treated by simple orchectomy followed by extensive irradiation, operation having been omitted only if extensive metastases were present.

Irradiation was started within a few days after the operation and applied not only to areas of regional invasion but also to areas of probable distant extension, regardless of whether or not there was obvious evidence that metastasis had already occurred. The treatments were grouped at from 8 to 10 week intervals. The first series included four or five portals for the pelvis and groin, three or four portals over the para-aortic lymph nodes, 2 for the supraclavicular and cervical nodes, and 2 portals for chorioepithelioma of the skull. In the second and third series of treatments only the pelvis and abdomen were irradiated. The portals were large, and full doses were delivered in a single session per portal, at the rate of one portal per day. The factors used were usually 200 kv., half-value layer 1.9 mm. of copper, 50 cm. skin-target distance, intensity 15–20 roentgens/min. The full dose amounted to 100 per cent SUD for the first series, 90 per cent for the second, and 80 per cent for the third, with 100 per cent SUD set at 525 roentgens in air (785 roentgens with backscatter). In some heavy patients the factors chosen were 500 kv., 7 mm. of copper, 60 cm. skin-target distance, at 20 roentgens/min. In these cases the dose was 675 roentgens/air (925 roentgens with backscatter). This gave a tumor dose of 110 per cent SUD for the first series and 70 per cent SUD for the third.

The age of the patients treated ranged from 17 months to 72 years, with the peak incidence of the tumors (71%) being between 25 and 45 years. The authors do not present the histological classification of their cases, but refer to the general agreement in the literature that malignant teratoma tends to occur in younger people, reaching a peak incidence at the age of 23 in the series of Friedman and Moore and carrying a poor prognosis, whereas seminoma had a peak incidence at the age of 30 in the same series and a better prognosis.

The authors studied the 2, 5, 10, and 15 year survival rates in their series from a number of clinical aspects. They found that the patients presenting themselves for treatment in the fourth decade had the highest survival rate for all periods, although the frequency of metastases at the time treatment was initiated was as great as in some other age groups. The results were poorest in the very young.

Cryptorchidism (8%), other scrotal abnormalities (14%), such as hydrocele, varicocele, or epididymitis, and gynecomastia (7 cases) did not appear to influence the prognosis unfavorably. Instead, patients with these complications were apt to have their attention called to the tumor at an earlier stage and hence to receive more prompt treatment. About 70 per cent of this group of patients attained 5 year survival. In the same way, a history of recent trauma (30%) was not unfavorable, for it, too, tended to bring the patients for examination more promptly, at a time when fewer of them showed obvious metastases. Sixty-one per cent of these survived 5 years.

On the other hand, pain was an unfavorable symptom, for those patients complaining of it showed a slightly higher incidence of metastases at the start of treatment and a much poorer survival rate (48% at 5 years, and 28% at 10 years) than those with a painless swelling of the testis (62% survival at 5 years, and 51% at 10 years).

As the duration of the acute progressive symptoms lengthened before treatment was sought, there was a steady increase in the per cent of metastases found at the time of first examination and decrease in the ultimate survival rate. Patients who received treatment within 3 months of the onset of symptoms had a 5 year survival rate of 71 per cent, compared to 42 per cent for those who had waited a year.

Forty-three per cent of the patients had clinically evident metastases—para-aortic, supraclavicular, inguinal, pulmonary, or generalized—when they first reported for treatment. Yet the statistical analysis showed that even these patients had some chance for long-time survival, for 31 per cent were living 2 years later, 29 per cent at the 5 year period, 19 per cent at 10 years, and 7 per cent at 15 years. The survival figures for the group without obvious initial metastases were, of course, much better: 91 per cent at 2 years, 78 per cent at 5 years, 66 per cent at 10 years, and 50 per cent at 15 years. If all the patients are taken together, 55 per cent lived 5 years, 43 per cent 10 years, and 33 per cent 15 years. The 2 year survival rate was found to be a good prognostic index for 5 year survival.

These figures agree well with those reported in the literature for patients with a malignant testicular neoplasm treated by combined orchectomy and extensive irradiation, the 5 year survival rate from various sources averaging about 50 per cent, with a low of 25 per cent for malignant teratoma (Schutz and Leddy, 1946) and a high of 67.7 per cent for seminoma (Nash and Leddy, 1943). They are in sharp contrast to the over-all survival rates recorded following orchectomy only, the highest 5 year rate being the 24 per cent reported by Higgins and Bichert in 1939. LILIAN DONALDSON, M.D.

Roentgen Therapy of Carcinoma of the Female Urethra and Vulva. FRANZ BUSCHKE and SIMEON T. CANTRIL. *Radiology*, 1948, 51: 155.

On reviewing the literature the authors found that external roentgen therapy was not used in a systematic way for the treatment of the primary lesion of either carcinoma of the vulva or urethra. Indeed, by some it was branded as an inadequate weapon in these neoplasms if used within limits that avoided deleterious by-effects. The authors believe this to be a misconception based on an insufficient appreciation of the importance of the quality of the radiations used. They agree that low-voltage irradiation will not be tolerated by the vulvar mucosa in doses necessary for sterilization, even if the entire tumor can be irradiated homogeneously at such voltage, but their own experience with a small group of cases followed up over a period of years indicates that with radiation in the 200 kv. range a tumor-sterilizing dose can be delivered which is still tolerated by the sensitive vulvar mucosa.

The authors are of the opinion that comparatively small carcinomas originating in the labia, clitoris, or posterior commissure are better treated by radical excision, radiation therapy being reserved for the more advanced stages of these lesions in which surgery cannot be expected to remove the entire lesion because of diffuse extension into the neighboring subcutaneous structures. They find the curability by radiation therapy, even of advanced lesions in these locations, reasonably good because of the comparatively low degree of differentiation of the epidermoid carcinomas usually encountered there. They also consider radiation therapy as the procedure of choice in the treatment of even small lesions in the periurethral portion of the vulva, the surgical removal of which would necessitate the destruction of the urethra, often with poor functional results.

Carcinomas originating in the urethra itself present a different histologic picture, since they frequently originate from glandular structures and undergo metaplasia into adenocanthoma, often exhibiting less radiosensitivity than vulvar carcinomas. However, neoplasms in this region give symptoms at an early stage when tumor volume is still small, and can therefore be included in a small field of irradiation. Hence the reaction can be kept within reasonable limits of intensity and late tissue changes are minimized while satisfactory function is maintained.

Therefore, the authors selected early carcinomas of the urethra and advanced carcinomas of the vulva for radiation therapy. The vulvar group was comprised of 8 cases too advanced for radical surgery. The patients ranged in age at the time of treatment from 39 to 82 years. Of them, 5 are well 7, 5, 3, 2.5, and 1.25 years, respectively. Three, who already had obvious regional metastases at the time treatment was undertaken, were dead in a little over a year. The doses in the controlled cases varied between 4,000 and 4,500 roentgens/skin given in from 20 to 26 days through fields measuring from 20 to 35 sq. cm. Mucosal reaction developed between the sixteenth and twenty-fifth days following the beginning of treatment, and was not completely healed until the forty-second to forty-fifth day. Permanent mucosal changes were minimal.

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Four cases of true carcinoma of the female urethra, including 1 undifferentiated epidermoid carcinoma and 3 adenocanthomas, are presented. Two other cases with treatment for carcinoma but on later histologic review classified as urethral caruncles, are also recorded for the late condition of the mucous membrane after heavy irradiation. These carcinomas received external roentgen therapy directed against the urethral opening through one field 3.5 cm. in diameter with the beam coinciding with the axis of the urethra.

All of the patients in this series were treated with 200 kv. radiation, with from 1 to 2 mm. of copper filtration. The first patient, aged 61, received a skin dose of 5,650 roentgens in 20 days and developed a massive primary reaction lasting from the twentieth to the sixty-fourth day, which at times necessitated the use of an indwelling catheter, and was productive of a small area of late necrosis 1 year after treatment. However, the patient is well, with good function, 5 years after irradiation, but with a mild grade of urethral stricture and moderate mucosal atrophy and telangiectasis. The changes are sufficient to necessitate constant lubrication and scrupulous cleanliness of the parts to avoid intercurrent infection, and the authors consider the area to have been overtreated. The 3 patients with urethral adenocanthomas, aged from 57 to 65, received only 5,200, 4,600, and 5,000 roentgens/skin in 22, 32, and 29 days, respectively. The first of these developed a mild mucosal reaction between the twenty-eighth and fifty-first days, with a small area of late necrosis at 6 months, and has been well now for 4 years with good function and very slight mucosal atrophy. The 2 other patients received, respectively, 4,600 roentgens in 32 days and 5,000 roentgens in 29 days, and developed mild mucosal reactions from about the thirty-sixth to forty-sixth days, followed by excellent healing. One has been well for 2 years; the other, as yet followed up for only 1 year, shows the primary site to be healed but has required excision of 2 metastatic nodules in the adjacent labium and skin.

In reviewing the immediate and late results in this small series of cases of urethral carcinoma, the authors believe that a total dose of around 5,000 roentgens/skin in about 25 days is tolerated by the mucous membrane for the small fields necessary in this type of lesion and is apparently sufficient for tumor sterilization. They regard the limit of tolerance as not over 5,200 roentgens/skin, and warn that the reaction of the tumor and surrounding mucosa in this location appears late, after the end of adequate treatment, and cannot therefore be used as a guide in the conduct of therapy for these rare lesions.

LILIAN DONALDSON, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Trophic Nerves and Dupuytren's Contracture (Trophische Nerven und Dupuytrensche Fingerkontraktur). PAUL REICHEL. *Chirurg*, 1946, 17–18: 97.

The author presents the question as to whether or not there are truly trophic nerves.

Three possibilities might explain the trophic changes which occur following the interruption of a nerve. The changes may be produced by a vasomotor effect, by traumas to which the denervated part cannot react normally because of the anesthesia or absence of normally protective reflexes, or by the lack of certain, at present unknown, influences exerted by special trophic nerve fibers.

The author is an adherent of the third theory and justifies his opinion by pointing out the appearance of corneal ulcers following gasserian ganglion resection, which he does not believe can be caused simply by trauma or a vasomotor effect.

Reichel has observed 5 cases of Dupuytren's contracture following injuries to the ulnar nerve. In all of these the nerve injury was unilateral, but the connective tissue changes were bilateral. This, he feels, is easily explained on a nervous basis. Furthermore, he suggests that an accurate anamnesis in cases of Dupuytren's contracture will often reveal a history of trauma, sometimes remote in time and location, to the ulnar nerve. He concludes that this entity is a trophoneurosis. WILLIAM C. BECK, M.D.

A Case of Juvenile Dupuytren's Disease (Su un caso di morbo di Dupuytren giovanile). VITTORIO FINAMORE. *Ann. med. nav.*, Roma, 1947, 52: 97.

The author describes a case of Dupuytren's disease in an 18 year old boy, in whom this condition had been present for some years. He first noted difficulty with the small finger of his right hand and this gradually increased. The next three fingers were then also gradually affected in a similar manner. When examined he showed marked flexion of all four fingers, and only the index finger could be extended to any degree. The usual cordlike structures were palpable in the palm.

Under local anesthesia an excision of the palmar aponeurosis was performed with good results. The author cautions against the addition of adrenalin because of the reported cases of gangrene following its use in association with local anesthesia of the extremities. Early diagnosis is stressed as well as the necessity of resorting to surgery before ankylosis of the phalangeal joints occurs.

The literature on the subject is reviewed. Felix Plater first mentioned this condition in 1821, and Cooper recognized it in 1821, but it was first accurately described by Dupuytren in 1832.

LUCIAN J. FRONDUTI, M.D.

Surgical Repair of the Hand. New Material for Plastics of the Hand. Preliminary Communication (Cirugía reparadora de la mano. Nuevo material para plasticas de la mano). CARLOS A. DEFILIPPI. *Dia méd.*, B. Air., 1948, 20: 927.

The material used by the author in 2 cases consisted of strips of bovine fascia which are very pliable and extremely well tolerated by the organism. In fact, the favorable results obtained with this material tend to make him prefer it to autografts and to base great hopes on its possibilities. The advantage of obtaining a graft without having to increase the risks and the stages of the operation, and the ease with which large amounts of this fascia can be obtained have led to the creation of a simpler technique for extensive tendinous plastic operations.

Four years before admission, a woman of 40 suffered a wound of the digitopalmar fold of the annular and index fingers of the left hand which left these fingers stiff and without flexion because the corresponding tendons were severed. Under local anesthesia in the middle third of the forearm and block of the nerves at the wrist, an incision in the form of an S was made, and it was found possible to reunite the two ends of the tendon of the index finger according to Bunnell's technique. The suture site was enveloped in a sheath of bovine fascia to avoid adhesions. The distal tendon of the ring finger had disappeared; therefore, an external and lateral incision was made and a strip of fascia was sutured to the third phalanx. Two strips of the same material were placed around the other two phalanges to serve as pulleys, and the proximal end of the first strip was then sutured to the remaining tendon. The skin was closed with linen sutures and a dorsal plaster of Paris gutter was used for immobilization with the fingers in semiflexion. Unfortunately, the patient developed ischemia of the third phalanx and later its distal portion was eliminated, but a good stump was left. Recuperation was estimated at 60 per cent of normal.

A man of 27 suffered a wound of the lower third of the back of the right forearm which resulted in the loss of extension of the three last fingers. Under local anesthesia at the middle third of the arm, an arclike incision was made, 20 cm. in length, and scar tissue was found to envelop the severed ends of the tendons for about 8 cm. The scar tissue was resected and the tendon stumps were freed until healthy tissue was reached. Two parallel strips of bovine fascia, 8 cm. long, were used, one for the tendons of the middle and ring fingers, and the other for the little finger. To avoid adhesions with the superficial tissues, the strips were enveloped in a vein taken from the cutaneous flap. The extremity was kept at rest in a plaster of Paris gutter which was removed after 15 days. Recuperation of function was 100 per cent. RICHARD KEMEL, M.D.

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Repair of Cicatricial and Dupuytren's Contractures of the Hand. HANS MAY. *Plast. Reconstr. Surg.*, 1948, 3: 439.

The common causes of cicatricial contractures of the hand are shrinkage of the skin and fascial structures from prolonged and rigid immobilization of the hand in faulty position after injuries, infections, and burns. The vast majority of these contractures could be avoided if the hand were immobilized in a position of function. When the wrist is held in flexion, that is, in wrist drop, and allowed to remain in this position, the extensor tendons are maximally stretched; hence, they cannot be relaxed further if an attempt is made to close the hand to make a fist. This prevents full function of the flexor tendons. The fingers are drawn in hyperextension in the metacarpophalangeal joints, the thumb is drawn back to the side of the hand and the collateral ligaments of the metacarpophalangeal joints are relaxed and shortened. There is a rapid shrinkage of the collateral ligaments, which prevents normal gliding of the phalangeal joint surface over the head of the metacarpal bone. The posterior part of the joint capsule is contracted. The entire lumbricale system is upset. This is the well known picture of the claw hand.

This contracture can be prevented by immobilizing the hand in the position of function, namely, extension or cocked-up position of the wrist, midflexion of the metacarpophalangeal and interphalangeal joints, and abduction and opposition of the thumb. If contractures have developed, those of the thumb should be overcome first by conservative methods in the form of elastic splinting with the incorporation of elastic traction, in association with occupational and physical therapy, or by operative reconstruction. Burn contractures present some of the most difficult problems of reconstructive surgery. The difficulty is primarily because of the depth of the scar; while in other parts of the body a severe burn does not cause any functional damage since the epithelium regenerates from the remaining layer of the cutis, on the hand, particularly at the dorsum, second degree burns quite frequently are followed by severe contractures from keloidlike scars. The contractures of the deeper structures, namely, the fascia, ligaments, and tendons are most disastrous. Most of these can be avoided if the hand is properly immobilized during the healing stage, and skin grafting is employed early. This is true especially in third degree burns.

The principle in correcting these contractures consists of excision of the entire cicatricial surface tissue followed by repair of the contracted fascial structures, and closure of the defect with a graft or flap. A free graft, however, will not take on naked tendons, bones, or joints; therefore, every effort should be made not to expose these structures during the excision of the cicatrix.

The operation is carried out in a bloodless field, by the use of a pneumatic tourniquet. The entire scar is outlined with an incision and the depth of the incision depends upon the depth of the scar tissue. In a second degree burn the excision of the cicatricial skin is carried at the level of the subcutaneous veins. Care should be taken not to injure them. In third degree burns excision of the scar tissue is done at the level of the deep structures. However, care should be taken not to expose the tendons if the use of a free skin graft is considered. In the majority of cases, exposure of the tendons can be avoided by removing the scar tissue over the tendons in layers, and stretching of the tendon is gradually done by cross-cutting the covering tissue in numerous places until full or almost full relaxation of the tendons can be reached. The forearm and hand is then immobilized in the position of function. Oftentimes, a wire is passed through the terminal phalanx and fastened to the end of the splint. The splint is bent until the fingers are in 45 degree flexion in all the joints. The defect is then covered with a full thickness graft or with a thick split graft. If the tendons are exposed, the use of a pedicled flap is the only choice. Sutures are removed after 8 days and the splint remains in place for another 6 days. Warm saline hand baths are administered daily with active and passive motion exercises while the hand is in the water. The splint is discarded entirely 3 weeks after the operation.

Dupuytren's contracture of the palmar aponeurosis must be classed among diseases of unknown origin. The disease progresses gradually to involve not only the palmar part of the aponeurosis but the fourth and fifth fingers, less often the other fingers, but very rarely the thumb. It is impossible to restore motility of the fingers if the latter are arthritic and ankylosed. Insufficient removal of the diseased structures invites recurrence. The peculiar process is not confined to the palmar fascia alone, but often the skin over the diseased fascia is involved, so that recurrence of the contracture in the skin occurs, even after removal of the underlying fascia. Because of the involvement of the skin and the fascia both should be removed when involved, and only after complete removal of the fascia and fascial extensions can recovery be expected with return of good function.

The excision of the involved fascia and the involved skin must be radical. For example, it must include the fascial extension over the thenar region, the extension to the second, third, fourth, and fifth fingers; it must include the fascial extension, which connects the fascia with the underlying tendons and tendon sheaths, and also the diseased skin island. Great care should be carried out in the dissection to avoid injury to the digital nerves and vessels. The tendon sheaths should not be opened.

The forearm, hand, and fingers are immobilized in the position of function and a pressure dressing is applied. If the excision results in the exposure of the tendons, closure of the defect with an abdominal flap is advisable. JOHN E. KARABIN, M.D.

Hodgkin's Disease, 1832–1947. HERMAN A. HOSTER and MARY B. DRATMAN. *Cancer Res.*, 1948, 8: 1, 49.

Malpighi first described this disease in 1661; Hodgkin evaluated the disease as a clinical entity in

1832; in 1872, Langhans noted the presence of giant cells in lesions from this disease; in 1902, Dorothy Reed made her classic contribution to the histopathology of the disease. Scores of names have been applied in the past, but the official name now is simply Hodgkin's disease. The recorded incidence in the United States varies from 0.5 to 2.5 per 100,000 living population. Increased incidence has been reported in the last two decades, possibly because of the increased use of biopsy as a diagnostic procedure. The disease has a world-wide incidence. It can occur at any age, but is most frequent in young adults. Males are affected twice as often as females, and in childhood the ratio increases to more than 4 to 1. It has been said that the disease occurs more often in more than one member of a family than can be accounted for by chance alone.

Hodgkin's disease is considered to be a disorder of the entire reticuloendothelial system, but it affects the lymphatic system primarily. The rate of spread from node to node is variable and progressive with exacerbations and remissions. Some say the deeper nodes are really the first to be involved. The nodes are involved in chains and may be discrete or matted. The younger growths show a uniform, gray, bulging surface on section. The older ones are harder and show opaque, intersecting, yellow lines of fibrous tissue. There is little necrosis or suppuration. Splenomegaly is frequent and hepatomegaly less so. Gastrointestinal lesions are rare. Other abdominal organs are occasionally affected, but it is chiefly the abdominal nodes which are diseased. The mediastinal nodes are often involved and there may be spread to the heart and lungs. Pleural effusions are frequent. Bone lesions are a very frequent late manifestation. Direct invasion of the nervous system is rare but neurological symptoms are fairly common as the result of lesions of the meninges and surrounding bone. Varied and perplexing skin lesions often occur. The primary site is very difficult to evaluate because the disease is seldom diagnosed until it is moderately far advanced. The earliest microscopic change is said to be a proliferation of reticulum cells in lymph nodes. The spaces in the nodes are filled with these cells and with lymphocytes. Then there is a development of many eosinophiles, multinucleated cells, and large mononuclear cells followed by a conversion or degeneration of these cells into fibrous tissue. There is a reduction of lymphoid tissue of the normal type in involved organs and in uninvolved organs. There are various classifications of different phases of the disease such as paragranuloma, granuloma, and Hodgkin's sarcoma. Some believe the first two are chiefly inflammatory in nature while the latter is frankly malignant; but different nodes in the same patient at one time may show each of the above "stages."

Many authors relate the origin of Hodgkin's disease to recent infections about the head or respiratory tract, but this may be an effect and not a cause. Tuberculosis is fairly often concurrent with this disease. Painless, progressive enlargement of lymph nodes is the chief presenting complaint. Other symptoms are weight loss, anorexia, fever, pruritus, cough, and dyspnea. Remissions and exacerbations in the early disease are quite unpredictable. The Pel-Ebstein type of fever may occur. Pain is a common later symptom and is often due to bone lesions. The final diagnosis of the disease rests on biopsy. The prognosis is that of inevitable death but this may occur a few weeks after diagnosis, or not for many years. Females with the disease are said to live longer than males. The duration of illness is very hard to establish since the actual onset can usually not be determined even within several months. Death is due to generalized visceral invasion, secondary infection, or to destruction of the bone marrow. Terminal anemia is common. Changes in the white blood count are not constant or diagnostic. Marked eosinophilia is rare. Aspiration of the sternal marrow is not a positive diagnostic procedure. Most patients have an elevated sedimentation rate during active stages of the disease. No complement fixation or other serologic test has been devised. Without invasion of the kidney or pressure on the excretory urinary tract, urine changes are only those to be expected with any chronic, febrile disease. The elevation of the basal metabolic rate is proportional to the extent and the activity of the disease. Patients with advanced disease fail to react to the tuberculin skin test.

Roentgen radiation is the treatment of choice for localized disease. Some believe this does not influence the duration of life. Radiation must be used with care in the presence of tuberculosis and a depressed bone marrow. Superficial nodes are much more successfully treated than deep ones. Radium is not very useful with this disease. Other radioactive substances have been disappointing. In early cases, radical local excision plus radiation often gives better results than would be expected. Surgery may be necessary to relieve dangerous neurological symptoms due to pressure such as paraplegia. With this exception, some authors believe that surgery is useless and often dangerous. Vaccine and serum therapy have been disappointing. Chemotherapy, with the exception of the use of the nitrogen mustards (which are somewhat effective) has also, unfortunately, been of little or no avail.

There is much argument as to whether Hodgkin's disease is a neoplasm, an inflammation, a disease midway between these first two, or a metabolic disturbance. There is much evidence for either of the first two theories. The fatal termination suggests a neoplasm, but the very variable clinical course with its remarkable remissions and exacerbations suggests an inflammation. The histopathologic picture can be argued either way. Perhaps the truth is nearest the view that combines these two opposed theories. Unfortunately, this disease does not occur and cannot be produced in laboratory animals. Transmission experiments to animals have also failed in all but a few dubious cases. Many different

bacteria have been isolated from Hodgkin's nodes but this means little since the same bacteria can also usually be obtained from control nodes. Much of the early work in this field is of almost no value because of very inadequate aseptic procedures. Diphtheroids, brucella organisms, and tubercle bacilli have been especially worked with, but many authorities now say that none of these is directly concerned in the etiology of Hodgkin's disease. Gordon discovered an interesting encephalitic reaction in rabbits injected with material from Hodgkin's nodes. There was hope for a time that this might be useful as a diagnostic procedure but this failed when it was found that the same reaction could be elicited with many other types of material than Hodgkin's nodes and was apparently correlated with the concentration of eosinophiles in the material injected. Recently, interesting viruslike (?) inclusions have been demonstrated in tissue cultures of normal human lymph nodes grown in a fluid to which has been added a cellfree extract of Hodgkin's nodes.

JAMES WEAVER, M.D.

Hyperthermia in Association with Shock. JENS L. HANSEN. *Acta chir. scand.*, 1948, 96: 530.

The author presents clinical evidence to show the close association between shock and hyperthermia postoperatively in some cases. He suggests that the syndrome can be delimited on a purely clinical basis and should therefore be considered a specific postoperative condition.

This investigation extended over a period of 4 months, during which rectal temperatures were measured every hour for the first 24 hours after all operations of any size. Twelve of 20 patients with typical shock revealed no characteristic fluctuations of the temperature but in 7 a rectal temperature of between 39.1° and 40.5° C. (102° and 104° F.) was recorded, in from 3 to 10 hours after operation. The fever reached its maximum at the time the shock was most pronounced.

Blood samples were taken one to three times during the temperature rise, but the blood cultures were negative and the subsequent course revealed no evidence of infection; neither did the postmortem examination in 2 patients who died. After successful treatment of the shock the temperature fell at the same rate at which it rose, from .25 to 0.5 degree per hour.

Typical postoperative shock is often found to be associated with a sudden rise in temperature. It is stressed that the abrupt temperature rise occurs without chills and that the perspiration ceases during the temperature fall. The rise in temperature attending shock is due to reduced elimination of heat secondary to arteriolar contraction, mainly in the extremities, and the condition occurs when the organism strives to conduct the reduced circulating amounts of blood to the vital centers in the medulla oblongata. The temperature promptly falls after treatment of the shock by blood, plasma, and fluids. Blood cultures, the subsequent clinical course, and autopsies reveal no evidence of infection or other pathology as the cause of the hyperthermia.

JOHN H. MOHARDT, M.D.

Pterygium Colli and Allied Conditions. H. O. FOUCAR. *Canad. M. Ass. J.*, 1948, 59: 251.

The author presents a case of pterygium colli in a 19 year old patient, with a description of a new surgical procedure for the correction of this deformity.

An incision about 3 inches long is made in the midline posteriorly and the skin is undercut. A second incision about 5 inches long is made transversely at the top of the first incision, forming a "T". Each flap of the skin is then raised and pulled upward and inward until the skin folds are obliterated as in operations for the removal of wrinkles. The excess skin is excised to leave a triangular defect. The skin edges are sewn together in the form of a "T". The scar is posterior and well hidden by the hair or collar. Both folds are corrected through one operative field and it is possible to obtain symmetry very easily.

The author then reviewed the literature concerning various cases of pterygium colli, and he states that the condition is rare and widely distributed geographically. It does not appear to be hereditary but has been reported in 2 sisters.

In its simplest form it consists of a bilateral fold of skin arising from the mastoid region but occasionally from in front of the ear and extending to the shoulder. Usually it is thin, but it may be thick and can be picked up and stretched to the side of the neck. It consists of skin and subcutaneous tissue although it has been suggested that there may be some abnormality of the platysma myoides. The deep fascia and muscles are not affected. It is possible that there may be some deficiency and loss of tissue but there is no histologic evidence for this. The hairline is low posteriorly, giving the appearance of a short wide neck. The cervical vertebrae are normal and there is no impairment in movement. In most instances there is no mental retardation, but in some cases the condition suggests mongolianism.

Rarely, however, does it occur as simply as this, but is associated with a wide variety of malformations. Because of this association with these anomalies it is suggested that it is the result of faulty development of the neck and is thus related to iniencephaly, the Klippel-Feil syndrome, and Sprengel's deformity, and that the signs of these may overlap. A special subvariety has been described which exhibits the triad of infantilism, webbing of the neck, and cubitus valgus, and occurs in women. However, this type has also been reported in a man.

Endocrine deficiency, when present, may be regarded as secondary to the underlying congenital defect, and not as the primary cause of the condition. Endocrine therapy has caused some improvement in the genital symptoms.

In most reports there is no mention of treatment of this defect. One author suggests a bloodless orthopedic procedure. The only surgical techniques described were modifications of the "Z" type plastic

operations. General reference was made to other plastic methods without elaboration.

JOHN E. KARABIN, M.D.

Morbidity and Mortality in Talc Granulomas: Report of a Fatal Case. ALVIN J. SWINGLE. *Ann. Surg.*, 1948, 128: 144.

After a survey of the literature and on the basis of his own observations the author re-emphasizes the incidence of morbidity and postoperative complications in which talc powder has been incriminated as the etiological agent. He records the course of a patient who was operated on 14 times for adhesions and intestinal obstruction between her first and final admissions which terminated in the death of the patient, and gives the autopsy findings.

The clinical and experimental evidence incriminating talc as the etiological agent in the formation of intraperitoneal granulomas and adhesions is reviewed. In addition, talc granulomas have been reported in the skin, vagina, rectum, eye, gall bladder, healing surgical wounds, scars, and brain. In the Veterans Hospital, Wood, Wisconsin, Ross has found a large number of granulomatous lesions of the foreign body type among routine surgical specimens definitely identified as talc granulomas.

The commercial talc used on surgical gloves has been found to contain talc (82.7 per cent), calcium carbonate (8.7 per cent), and magnesium carbonate (7.6 per cent); 55 per cent of the particles were less than 5 microns in diameter. The portals of entry have been found to be perforations of gloves which occur in 22.6 per cent of all the gloves used, and rubber drains powdered with talc for autoclaving. Regardless of how thoroughly they are washed, subsequent examination under the polarized microscope will reveal many birefringent crystals still clinging to the rubber.

Since talc powder has been so conclusively demonstrated to be a dangerous agent in surgery, its use should be discontinued. Of the substitutes offered to date, the modified corn starch preparation recommended by Lee and Lehman seems best to fulfill all the requirements of a dusting powder suitable for use on surgical gloves and drains.

JOHN H. MÖHARDT, M.D.

Mineral Balance during Brief Starvation. The Effect on Serum Electrolytes and Mineral Balance of Maintaining the Intake of Certain Mineral Constituents. LEROY E. DUNCAN, JR., RICHARD J. MEYER, AND JOHN EAGER HOWARD. *J. Clin. Invest.*, 1948, 27: 389.

Two obese male patients were subjected to two periods each of 4 days of starvation. During one fast, each of the patients received only water; in the other, a salt mixture containing approximately the amounts of sodium, chloride, potassium, and phosphorus of a 1,200 calorie diet was given in addition to the water. Between the two fasting periods both patients were fed a diet containing 1,200 calories for 6 days.

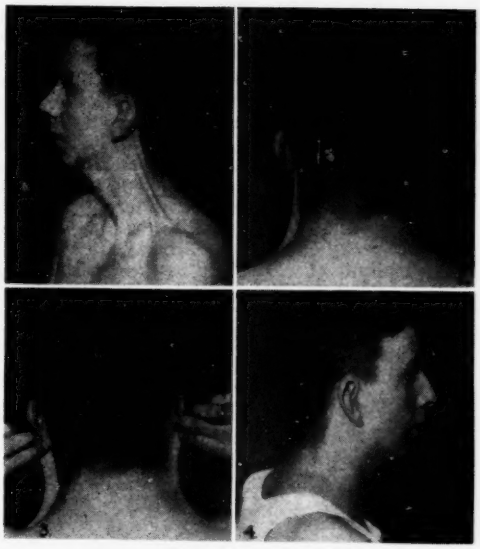

Fig. 1 (Foucar). Pterygium colli or webbed neck: lateral view.

Fig. 2. Posterior view showing folds of skin and low hairline, which give the appearance of shortness to the neck.

Fig. 3. Posterior view showing laxness of the skin.

Fig. 4. Lateral view after operation showing complete obliteration of the fold. Note also the inconspicuous scar posteriorly.

Administration of the salt mixture resulted in no lessening of the nitrogen lost by fasting and effected no alteration in the amount of weight lost. In one patient there appeared to be a considerable saving of potassium from the salt mixture, in the other patient none.

On the first day of the fasts, large savings of sodium and chloride were manifest from the salt mixtures, but thereafter excretion of these elements was rapid; and the total amounts of sodium and chloride lost over the 4 days were the same in the fasting periods with and without the salt mixtures.

The sodium, chloride, and potassium of the mixtures were almost completely absorbed, as judged from the quantities of these elements in the stools and by the increased amounts appearing in the urine. There was no appreciable rise in phosphaturia when the salt mixture was given, as compared with the fasting alone. In one of the patients there was heightened calciuria and hypercalcemia as a result of the salt mixture.

The concentrations in the serum of sodium, chloride, and potassium were uninfluenced by the salt administration. Stools were more frequent during fasting when the salt mixture was given, but only minimal amounts of the administered salts were recovered in the stools. WALTER H. NADLER, M.D.

Penicillin, Streptomycin, Dicumarol, and Blood Coagulation: Thromboplastic Properties of Penicillin. DAVID I. MACHT. *South. M.J.*, 1948, 41: 720.

Animal experiments and records of clinical patients show that penicillin shortens the coagulation time and the prothrombin time of whole blood. Some of the four crystalline-active principles of penicillin are more effective in this regard than others. For this reason, amorphous penicillin is more effective in shortening coagulation time than are the newer colorless crystalline preparations. Suitable doses of dicumarol can be used to antagonize the excessive thromboplastic effects arising from intensive penicillin therapy. In experiments on animals the reverse is shown, in that the prolongation of prothrombin time and whole blood coagulation which is produced by dicumarol can be corrected by penicillin. This mutual correction of penicillin and dicumarol enhances their use. JAMES WEAVER, M.D.

An Italian Precursor to the Study of Penicillin (Un italiano precursore degli studi sulla penicillina). GIUSEPPE PEZZI. *Ann. med. nav.*, Roma, 1946, 51: 251.

The author states that on page 91 of the first number of the Annali d'Igiene Sperimentale for the year 1895 appears an article entitled "On the Extracts of Certain Molds—Researches by Doctor Vincenzo Tiberio." He then gives important quotations from the original article, which bring out the work done by Vincenzo Tiberio on molds. This work was done before Tiberio entered the naval medical service, while he was an assistant in the Pathologic Institute and afterward in the Institute of Hygiene of the University of Naples.

The original article is divided into three parts: (1) preparation of the cultures, (2) preparation of aqueous extract with bactericidal power, and (3) the chemotactic power and action of molds in the experimental infections with the typhoid bacillus and Vibrio of cholera.

The conclusions arrived at by Tiberio and quoted by Pezzi are as follows:

"In the cellular substance of molds are contained water soluble principles which possess a bactericidal action . . . I do not pretend to state that this action extends to all bacteria . . . The liquid obtained (from penicillium and aspergillus) is endowed with notable chemotactic powers . . . This liquid has a preventive and therapeutic action."

Thus, Pezzi states that although the work of Tiberio remained within the limits of the laboratory, the concepts arrived at by him were exact. A brief review is made of different products derived from organisms and used as antibiotics and therefore leading up to streptomycin.

A brief life history of Vincenzo Tiberio follows, showing that he was born on March 1, 1869 and died on January 7, 1915. At the time of his death he was Director of the Cabinet of Hygiene and Bacteriology at the Marine Hospital in Naples.

LUCIAN J. FRONDUTI, M.D.

The Toxicity of Sodium Alginate in Cats. MAYNARD B. CHENOWETH. *Ann. Surg.*, 1948, 127: 1173.

An absorbable, hemostatic, and readily manufactured surgical gauze which can be sterilized by autoclaving can be prepared from alginic acid, the product of certain seaweeds. Because of the usefulness of absorbable surgical gauzes, the discovery of a material which, on manufacturing grounds, is as suitable as alginic acid, is very important. The toxicity of commercial sodium alginate was studied by the intraperitoneal or intravenous injection in cats. Solutions of sodium alginate resulted in the production of large antemortem intracardiac clots. The toxicity of alginate gauze was also studied by this author.

As the result of this study of the action of alginic gauzes in the animal body, the material cannot be recommended for surgical use as an absorbable gauze. It would seem that the ability of alginic acid to form gels with calcium, which may or may not be the mechanism underlying its hemostatic action, is sufficient to cause serious localized circulatory embarrassment. C. FRED GOERINGER, M.D.